

In This Issue—EVOLUTION OF THE CREEPER TRACTOR

AUTOMOTIVE INDUSTRIES

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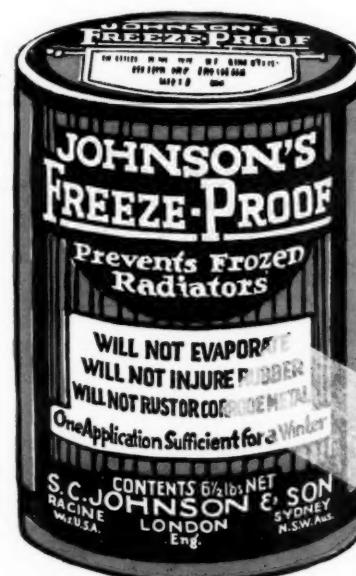
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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XXXVII

NEW YORK—THURSDAY, NOVEMBER 8, 1917—CHICAGO

NO. 19

Prohibition of Steel Shipments Temporarily Held Up

Order of War Industries Board Stayed Pending Formation of Committee Representing Automobile Industry

WASHINGTON, D. C., Nov. 7—The order of the War Industries Board prohibiting shipments of alloy steel for the manufacture of passenger automobiles has been temporarily stayed as the result of a conference of the passenger automobile industry as represented by the directors of the National Automobile Chamber of Commerce and the directorate of the Motor and Accessory Manufacturers with the War Industries Board last Friday.

At this conference it was agreed that the automobile industry should appoint a special committee of three or five to represent all departments of the industry, and such committee to open headquarters in Washington and to co-operate with the War Industries Board in all matters relating to shortage of alloy steel, or shortage of any other metals that might arise.

On agreeing to the proposal for such a committee representing the automobile industry, the War Industries Board partially agreed not to prohibit shipments of alloy steel for passenger automobile manufacture until the committee was organized and assumed control of such matters in Washington unless acute conditions arose which in the judgment of the War Industries Board made the absolute prohibition of alloy steel to the

passenger automobile industry necessary.

Committee of Big Men

In the meantime the automobile industry is appointing its committee of five, or three, as the case may be. The consideration of appointments was taken up immediately following the conference with the War Industries Board on Friday, but the importance of selecting the best men made it impossible to agree on immediate selections. The N. A. C. C. has the appointment of one man, and the M.A.M. another. It is possible that these two organizations will agree on the selection of others. It is planned that this committee, which will represent the passenger automobile industry with the government, will have on it the biggest minds in the industry and those best qualified to handle such questions as alleged shortage of materials, etc. Present plans are to open permanent headquarters in Washington where the committee members will reside as long as conditions demand.

The manner in which the M. A. M. and N. A. C. C. worked as one is one of the hopeful indications of the situation.

The N. A. C. C. directorate arrived Friday morning, and the entire day was spent in common session with

the M. A. M. until the time of conference with the War Industries Board, 4 p. m., arrived. The conference was held in the new building of the Council of National Defense.

Howard E. Coffin was the spokesman representing the automobile industry, although Col. Chas. E. Clifton introduced the subject on behalf of the industries. Mr. Coffin's talk presented the agreement of the two bodies representing the industry, and the major demand was for the appointment of a committee, which was immediately agreed to by the War Industries Board.

Among those present representing the automobile industry were: Col. Chas. E. Clifton, Alvan Macauley (Packard), H. H. Rice (Chevrolet), R. D. Chapin (Hudson), J. Walter Drake (Hupmobile), R. H. Collins (Cadillac), E. B. Jackson (Overland), J. R. Lee (Ford), and Messrs. Kelly (White) and Hastings (Hupmobile).

Representing the Motor and Accessories directorate were: President C. W. Stiger (Stromberg), W. O. Rutherford (Goodrich), E. H. Broadwell (Fisk), Christian Girl (Standard Parts), Thomas Wetzel, and Wm. M. Sweet (United Motors). Alfred Reeves and L. M. Bradley, respective managers of the N. A. C. C. and M. A. M., were present.

Howard E. Coffin Says We Are Beginning a Great Economic Mistake

**It Is Nationally and Economically Unsound Statesmanship to Restrict
the Third Manufacturing Industry in the Country Without
Sufficient Facts Upon Which to Base Conclusions**

WASHINGTON, D. C., Nov. 2.—“This is the beginning of a great economic mistake.”

In these words, which are certain to become historic in the automobile industry, Howard E. Coffin summed up the opinion of the automobile industry of the action of the War Industries Board in issuing orders prohibiting the shipment of alloy steel for passenger automobile manufacture. Mr. Coffin’s words represented the undivided automobile industry.

Their significance rests on the conclusion of the automobile industry that it is nationally and economically unsound statesmanship to start thus restricting the third manufacturing industry in the country without the complete facts at hand as to whether there is such a steel shortage as alleged.

The automobile industry believes there is no shortage existing that warrants the proposed action of the War Industries Board. This conclusion is corroborated by Chas. M. Schwab, who in a statement has declared there is no scarcity of steel and no necessity for a restriction of the passenger automobile industry.

The statement is further corroborated by one of the alloy-steel manufacturers, who says that makers of steel are operating at 80 per cent capacity and that he could increase the output of his factory 10 per cent in 3 months by bonus systems.

Is This Industry Non-Essential?

The words of Howard E. Coffin have added significance because the action of the War Industries Board savors of having classified the passenger-car industry as a non-essential and a luxury. Perhaps the board has reached its decision as a result of the war tax, which classifies the industry along with musical instruments, and undoubtedly puts it in the rank of non-essentials. That seems to be the conclusion of Washington.

The present act of the War Industries Board suggests the unexpected ramifications of such an estimate of the industry, and it is this fact, coupled with the possibilities that the future may have in store, which led the industry to designate the order prohibiting shipment of alloy steels as “the beginning of a great economic mistake.”

Washington seems to have been led to its conclusion that the automobile industry is a non-essential through comparison with the industry in England and France since the starting of the war. In England the use of passenger cars has been restricted until it practically ceases to exist. The manufacture of passenger cars was completely stopped approximately a year ago. There is no intimation as to what the War Industries Board has in mind by way of future restrictions in America, but from its attitude it might be inferred that restrictions similar to those in England would be added as deemed necessary.

Where Comparisons Are Odious

Fortunately, the industry in England cannot be compared with that in America. Restrictions that have been placed on the industry in England could not possibly be placed on the industry in America with the same degree of national efficiency. In America, the automobile industry is the third manufacturing industry. As a production industry it stands without peer in the world. No other nation has ever brought automobile production onto the same basis as America. No other nation was ever able to produce the low-priced machine in such quantities as has America.

In England the automobile industry previous to the war was not one of the large, stable industries of the country. It was not a production industry. It was not a great export industry. It was an industry manufacturing automobiles for the classes and not for the masses. In England the farmer did not own an automobile. The country did not make an automobile for him. It made exclusive types of automobiles for the rich. It had not grasped the thought of making low-priced practical automobiles for the farmers and the masses—the thought upon which production has been based.

How different in America, where the farmer is purchasing 80 per cent of the automobiles, and in the agricultural States, where for years he has been purchasing 80 to 90 per cent of the machines sold in those States. Iowa has the highest percentage of cars owned per thousand of population of any State in the Union, and it is one of

Here Is the Situation

- 1—*The government started to cut down automobile production.*
- 2—*The automobile industry opposed the cut. It suggested that the industry, through a committee, be permitted to do the cutting. This committee has been formed.*
- 3—*This means that car production CAN continue so long as the industry can show itself capable of making all needed munitions at the same time.*
- 4—*Every corporation and individual MUST co-operate with this committee if the industry is not to be unduly crippled.*

the premier agricultural States. This fact has for many years stamped the automobile as an essential in American life.

A further comparison of the American automobile industry with that of England: The scarcity of gasoline in England made it necessary to restrict the use of passenger automobiles. There the price of gasoline reached \$1.10 per imperial gallon, and at that price it was issued on a coupon basis. To-day the price is about 92 cents per gallon, and only limited amounts are permitted.

In America there is no shortage of gasoline. Official figures from the Bureau of Mines show that there is scarcely any drawing on storage supplies, and that the development of new wells is going ahead rapidly, and is only being restricted by a shortage of casing for the wells and shortage of labor in some sections. Official estimates declare that there is sufficient oil for all America's needs and for our Allies as well. With this situation existing, the War Industries Board, or any other organization, is not warranted in classing the automobile as a luxury or a non-essential.

Another comparison of the American automobile industry with that of England, to show the error of attempting to restrict our industry on superficial comparisons: As the war developed, England found it necessary to control her industries as they best suited war requirements, and as it was possible to buy in foreign markets, such as our own.

She restricted those industries which were not her best production industries. She restricted those industries where it was possible to buy to greater advantage from America than to manufacture herself.

With her automobile industry never on a production basis, and with it possible to buy cheap-production machines from us, it is little wonder that England should consider it better national war policy to reorganize her factories on production basis for munition manufacture rather than keep them on a highly inefficient standard of automobile manufacture.

England could do what she wished with her automobile industry, from the viewpoint of national defense, because she could purchase from the United States automobiles cheaper than she could manufacture them at home.

This does not apply to America. With us, the indus-

try represents one of the highest standards of American spirit in its development of production manufacture. No other industry has made such progress in standardization of parts as has the American automobile industry. It is an object lesson to the world. Its example is being imitated by every other manufacturing nation. Its standards have already been adopted in considerable quantities in England and France. The industry represents one of leadership, and as such the industry saw in proposed restriction the beginning of a great economic mistake on the part of the War Industries Board.

Further, there is no other country to which we can look to buy automobiles if we need them, as England, France and Italy looked to us. We cannot look to Mexico, to the countries of South America, to the countries of Asia, or to the countries of Africa or Australia. Manufacturing automobile industries do not exist in those countries. We, if the expression may be used, constitute the country of last resort. We must be prepared to manufacture, ourselves, to meet not only our own needs but those of all the Allies.

As such, the automobile industry in America cannot in any wise be sacrificed because of any alleged shortage of alloy steels; and if such shortage exists, it must be substantiated by indisputable facts, and, with the facts known, the industry should have the consideration of Washington to have a hand in its reduction, if such has to come. In the act of the War Industries Board last week the industry was not consulted. The board forbade the shipment of alloy steel by four makers of such, and it was only the protest of one company against such a ruling that brought the matter to the light of day.

It is more than possible that the Chamber of Commerce of the United States of America saw in the action of the War Industries Board the beginning of a similar great economic mistake when it presented a memorial to that board a day or so later asking for a definition of what constitutes a non-essential industry. That association unquestionably realizes that if you destroy industries such as the third manufacturing industry you curtail the potential power of the nation. You cut down its war fighting powers. You reduce its business capacity. Instead of keeping the nation strong and healthy, you undermine its health and financial strength.

(Continued on page 818)

How Important Is the Merchandising Branch of the Automobile Industry?

Akron, Ohio.....	\$6,000,000
Albany, N. Y.....	175,000
Birmingham, Ala.....	37,500
Bloomington, Ill.....	25,000
Boston.....	2,497,000
Buffalo, N. Y.....	4,000,000
Champaign, Ill.....	108,000
Chicago.....	969,350
Clinton, Iowa.....	9,000
Colorado Springs, Colo.....	27,800
Davenport, Iowa.....	250,000
Denver, Colo.....	70,000
Des Moines, Iowa.....	150,000
Duluth, Minn.....	300,000
Fargo, N. D.....	3,500,000
Fort Worth, Tex.....	2,000,000
Grand Rapids, Mich.....	25,000
Hartford, Conn.....	120,000
Indianapolis, Ind.....	750,000
Kansas City.....	150,000
Los Angeles.....	500,000
Memphis, Tenn.....	121,100
Milwaukee, Wis.....	550,000
Minneapolis.....	400,000
New Haven, Conn.....	500,000
New Orleans, La.....	75,000
New York.....	12,705,000
Newark, N. J.....	250,000
Oklahoma City, Okla.....	250,000
Philadelphia.....	1,000,000
Portland, Ore.....	50,000
Rochester, N. Y.....	400,000
Rockford, Ill.....	20,000
San Francisco.....	3,500,000
Spokane, Wash.....	300,000
Springfield, Ohio.....	77,000
Stockton, Cal.....	150,000
Toledo, Ohio.....	1,500,000
Utica, N. Y.....	103,000
Worcester, Mass.....	50,000
Total.....	\$43,664,750

Only about one-third of the merchandising branch of the automobile industry is represented in this table. Yet this one-third invested forty-three and one-half million dollars in the Second Liberty Loan.

No Evidence of Steel Shortage Can Be Obtained

**Enough Steel for 300,000 Airplanes Released by Drop in Demand
for Passenger Cars—Production of Alloy Steel Increasing
Rapidly—Ordnance Not Absorbing Large Quantities**

NEW YORK, Nov. 5—When the War Industries Board was asked at the hearing in Washington last Friday as to where the shortage of alloy steel actually exists, and no direct reply was forthcoming, it at once became apparent that the third largest manufacturing industry was being acutely threatened without the necessary evidence in the case being available. There was no specific proof at hand regarding a shortage of alloy steel that would warrant such a reduction in passenger automobile output as the orders of the board restricting makers of alloy steel making shipments for passenger automobiles would indicate.

There is no present evidence of a shortage of alloying materials, or of any new demand for alloy steel which would warrant any great change in its distribution. Far more will be made this year than last, owing to great expansions in the steel plants, particularly the addition of numerous electric furnaces. It is perhaps significant that the idea of a shortage came as a surprise to the steel makers who had no evidence in their business of any such thing, outside the general excess of demand over supply which is the same in most branches of the steel trade. Of our total output of alloy steel barely half is used in the manufacture of trucks, passenger cars and ball and roller bearings, the latter including the bearings sold to other trades.

It might perhaps be thought that a shortage of alloy steel would be created on account of the very large airplane program, but a little investigation shows that the amount of steel *already released* by the automatic curtailment of passenger car sales which has taken place is considerably more than sufficient to supply the steel to build 50,000 complete planes.

In 1916 the total production of alloy steel in the United States was 1,362,615 tons. This included tool steel, in fact every steel of a better grade than ordinary carbon steel.

As to the quantity of alloy steel consumed, precise and accurate figures are only obtainable for that small

proportion which is used in the manufacture of curves and switches for railroads and trolleys. This totaled only 28,562 tons in 1916. Various estimates as to the total amount absorbed by the automobile industry for passenger and truck manufacture average around 600,000 tons. Now, the forty per cent of production, which is not an extravagant estimate of the recent reduction in the passenger car business, will have released a good 150,000 tons of steel. In the manufacture of 50,000 complete airplanes, together with their engines, not more than 25,000 tons of steel would be required. In other words, the reduction in the output of automobiles which has already taken place would care for an output of 300,000 airplanes.

This figure sounds so prodigious that it would be natural to assume there was some error, and therefore it is perhaps desirable that this statement be elaborated a little. In the manufacture of an aircraft engine of normal size such as the Hispano-Suiza or the Liberty engine or any of the several others of about this power, something like 500 lb. of steel is used. This does not mean that the steel parts would total

500 lb. but that 500 lb. of raw material is necessary in order to produce these parts. In the airplane itself there is not very much steel, but what there is is fairly good steel. Stays, brackets and little sockets and all the fittings by which all the woodwork is tied together could total anything from 50 lb. upwards to perhaps 150 lb., according to the size of the machine. There are also the wheels of the landing carriage to be considered. Taking everything into consideration, 200 lb. for the total amount of finished steel on an airplane is a generous estimate. Nearly all the steel is sheet or wire, which means that the waste is very small indeed. Now 500 lb. plus 200 lb. is 700 lb., or very roughly one-third of a ton.

The real reason that the figure of 300,000 airplanes as being the steel equivalent of a forty per cent cut in the production of automobiles sounds so unbelievable is that while 300,000 sounds a gigantic number when applied to

The Steel Situation To-Day

- 1—All the automotive products, including trucks, airplanes and passenger cars, are well cared for by half the total tonnage of alloy steel produced in 1916.
- 2—More alloy steel is wanted now, and a steadily increasing quantity will be wanted for ordnance.
- 3—There is a world-wide demand for tool steel in excess of the supply.
- 4—Tool steel output is mainly limited by a severe shortage of the alloying materials.
- 5—There is no severe shortage of nickel and chrome for structural alloy steels.
- 6—There is ample vanadium, and most of the automobile business can be cared for by vanadium and nickel steels. It can get along with very little chrome.
- 7—Ordnance plants are not yet ready to absorb any great quantity of steel.
- 8—Exports of steel are limited by shipping tonnage available.

airplanes, it is not as great as forty per cent of the 1917 automobile production would have been normally.

There is one other new source of demand for alloy steel, and this is, the greatly increased orders for guns and armor plate. Guns are usually either nickel or nickel-chrome steel, and armor plate is chrome steel. Normally the total production of both guns and armor is quite small, the weight of armor on a 30,000 ton battleship is not a large proportion of the total weight nor do its guns add up to anything very great in tonnage. The output of large guns is strictly limited by the small number of equipments for their making, and this is especially small in the United States, which was why the Allies bought so few guns here.

At the present time the Government is pushing the production of naval and military guns by the installation of its own new plant at Charleston and by the encouragement of private firms to put down gun plant. No figures on tonnage have been published, or are likely to be, but the estimated expenditure on guns for the army and navy announced in May this year is somewhere around \$200,000,000. Gun steel is also being demanded by Italy, and probably by some of the other allies also. Despite all of this, however, it must be remembered that 10,000 tons of steel produces an enormous number of military weapons, the labor in production and the elaborate plant needed being the principal factors in the manufacture of ordnance. All the gun and armor plants in the United States cannot begin to require more alloy steel than can readily be produced.

Some indication of the probable smallness of alloy steel exportation is given by the total figures for 1916. In that year all kinds of steel exported totaled 6,102,104 tons, out of which raw steel in blooms, ingots and billets was 1,508,727 tons. Bar steel was 773,997 tons. All the balance was made up of manufactured forms. Thus all

the alloy exported is included in the 2,382,724 tons of bar and raw steel. It is very unlikely that the proportion of alloy to other steels was as great as the production percentage, but supposing it was the same this would only give between 40,000 and 50,000 tons as the exported total for alloy steel.

Altogether there seem to be only two possible explanations of how an alloy steel shortage could arise, other than for tools. One is that some new use for it in hitherto unthought of quantities has been found abroad, and that all steel exported for a time will be alloy steel. This is hard to believe, since it is practically impossible that any such prodigious increase in the employment of alloy steel would be an absolute secret to the steel men.

The other possibility is that the Government desires to accumulate a great stock of alloy steel for ordnance and for airplanes. For example, the orders for the Liberty motor have been placed and many orders for ordnance. It is possible that when an order is given for say 1000 Liberty motors, some steel maker is ordered to forthwith supply all the steel necessary for making those motors, whether the plant is ready to use it or not. Just the same thing might happen with guns.

Now if every plant which has a Government order compelling the use of alloy steel is accumulating a stock of the material sufficient to carry it on for six months or more of future production, it is conceivable that the alloy steel industry would be disorganized. It would create the severest possible sort of a shortage.

Such a shortage, however, would be artificial. There would be no object in creating it, because all that is necessary to insure is that every plant on Government work receives the steel it needs *when it needs it*. The natural way to order steel for a Government production would be the conventional method of calling for so many tons a month.

Shortage Idea Surprises Detroit Buyers

Recent Conditions of Alloy Steel Market Gave No Indication of Stringency—Believed Large Stocks Are Stored in Some Plants with Government Orders

DETROIT, Nov. 5—Automobile buyers of alloy steel have not noticed any material change in the alloy-steel situation during the past month. There has been a general feeling that owing to the fact that the demands of the automobile industry are not in excess of 5 per cent of the total of the alloy steel produced in this country, and also because alloys used in the 5 per cent mentioned do not clash materially with the requirements of the Government, buyers have not been worried to any extent regarding a curtailment of supply, although taking the precaution to place orders many months in advance.

Recently a Government letter instructing steel manufacturers not to ship any alloy steels containing ferro chrome to any one not using the material in Government work was sent out. This material is used to a large extent in crankshafts, gears, propeller shafts, etc., and the order was the first indication that anything like a possible shortage was impending. This being followed up by the action of the War Industries Board reported, has made the situation acute. There is no disguising the situation that a cutting off of the available supply of alloy steels would immediately stop

the production of all passenger cars not intended for war purposes.

With the exception of Ford, which has a very high percentage of vanadium steel in its product, the average passenger automobile has a relatively small amount of alloy steel contained in its chassis. Leaving Ford out, and taking the chassis of the 3000-lb. car, the amount of alloy steel used is probably not in excess of 300 lb. This is made up by the crankshaft, transmission gears, valves, propeller-shaft parts, axle shafts, differential gears, and miscellaneous small parts. Ford alone uses about 300,000 tons a year of alloy steel, due to the fact that practically the entire chassis is made of vanadium steel.

On the average truck the proportion of alloy steel to the weight of the chassis is higher. A 2-ton truck weighing 4000 lb. may have as much as 2500 lb. of alloy steel used in its construction. The ratio of alloy steel employed, however, varies to such a great extent that an average is hard to fix. In taking the Continental Motors Corp. for example, which makes about the same number of truck engines as it does passenger-car engines, and with an annual use of alloy steel which will total 1500

tons, probably about 900 tons will be used for the trucks and 600 tons for the passenger cars.

The Timken-Detroit Axle Co., whose output is now in excess of 30 per cent Government work, uses from 10,000 to 12,000 tons of alloy steel annually. These concerns are representative of the assembled-car manufacturers.

The amount of tool steel used in the automobile industry is not so high in proportion to the output as in most industries. A concern like Packard will use 20 tons a year. Continental uses from 50 to 60 tons of tool steel annually, of which 40 tons is high-speed steel, containing tungsten. Timken-Detroit uses about 1 ton of tool steel a month of the high-speed product and about 1½ tons a month of the ordinary tool stock.

Government demands for airplane parts, gun carriages, trucks and parts required in navy work, etc., will naturally tend to utilize a great proportion of the alloy-steel produced.

Another factor creating a tightness in the alloy-steel market is that all those favored on the priority schedules are putting orders through for work in the future, which naturally ties up the production of all possible plants to the limit of their ability. It must be admitted, however, that this ability is limited by the labor situation in a great many of the steel-producing plants as much as it is by the demands made by the Government. Plants like the Midvale, which has been taken over by the Government, and like the Carnegie, which will accept no more business except for war purposes, have naturally reduced the number of sources. On the other hand, the fact that the production of automobile companies is off to a large extent, and the relative amount of alloy steel used is small, it certainly can be taken as the consensus of opinion that the demands of the automobile manufacturer on the alloy-steel producers are not sufficient to interfere seriously with Government work.

Beginning a Great Economic Mistake

(Continued from page 815)

A second phrase of practically equal significance was used by Howard Coffin in presenting the industry to the War Industries Board, when he declared that the industry would permit of no challenge of its patriotism in opposing a restriction of output starting with perhaps 15 per cent and increasing as the War Industries Board might see fit. Patriotism in these war days consists in a correct analysis of situations and in united opposition to superficial estimates, just as much as in singing the national anthem or waving flags. The industry believes that in opposing the present restriction until indisputable facts are agreed to by both parties it is acting patriotically in the great conservation of the fighting strength of the nation.

In taking this stand the industry always has, and still recognizes, that a portion of the passenger-car industry is a luxury. It has always been so, and will continue. The luxury end has been curtailed. Five months ago sales of passenger automobiles in the cities began dropping off. To-day they are off 60 per cent, depending on the city. This represents luxury business. It may largely represent the non-essential. In war times, luxuries and non-essentials are generally automatically cared for, and rarely call for special legislation.

What Is a Luxury?

Take a few examples: We may designate jewelry as a luxury business, but since the war the jewelry trade in Germany is greater than ever before; yet Germany is a country that naturally restricts and has been restricting its non-essentials.

You might classify the theaters of Paris and London as luxuries and non-essentials, but the attendance at them is to-day greater than at any time previous to the war. They represent a part of that national spirit, that national morale which is an essential to hold a people united, to keep up their spirits, and to keep them at an efficiency point during the war days.

The passenger automobile represents the dominating factor in what may be designated as the capillary system of our national transportation, if a comparison with the blood circulation may be referred to. The arteries are the vessels carrying fresh life-giving blood to all parts of the body, just as the veins carry back to the heart and lungs the blood laden with impurities which must be given off. The arteries cannot reach every minute portion of the body to which the life-giving blood is essential, but its distribution is accomplished by the

capillary system, which gets the blood to every particle. In a similar way other capillaries collect the impure blood, and, as in a great river system, the small creeks supply the main river, so do the millions of capillaries deliver the supply to the veins.

Motor Cars Are the Capillaries

In our transportation system our major channels are railroads and steamboat lines, and such minor systems as trolley service, motor-truck lines, and motor-bus lines. The capillary system comprises our millions of motor cars, horse vehicles, bicycles, and motorcycles. The business of the nation would stagnate without this capillary system. You cannot continue a healthy, robust national life and eliminate this bed-rock essential of national transportation. If we restrict this capillary system we restrict the earning capacities of the farms. We restrict the ability of the farmer to accomplish his task.

We restrict the huge stock-buying organizations whose buyers cover every crossroad in their motor car.

We restrict and delay the great grain-buying activities of the nation in which the buyers visit practically every farm in their motor cars.

We place restrictions on our medical profession, which is already below capacity of national demands.

We restrict the 10,000 business houses which have found it necessary to have the country salesmen use passenger automobiles because they can cover five towns in a day, whereas in sections thus served by railroads they cannot cover more than three.

We restrict the activities of our city sales forces of large organizations, who find it more efficient to use the passenger car, and who find their men have greater capacity with a passenger car than with the combined service of the trolley, the subway, the elevated, and the city buses.

It is these multitudinous ramifications of the passenger automobile which make it most imperative that this vehicle be not considered a luxury in its greater sense, and in the majority of its uses, and that in no way can it be classed as a non-essential.

Truly, any movement aiming at broad restrictions of such a national industry can only be described as the beginning of a great economic mistake, and what industry has not a right to publicly announce that it will not permit any challenge of its patriotism when it stands out against restrictions of such a national necessity?

What Is Non-Essential Business?

Chamber Holds Only Real Emergency Justifies Classing Industry as Non-Essential—Affected Industries Should Be Given Opportunity to Confer with Government Representatives

The following bulletin has been prepared by the Chamber of Commerce of the United States, which is co-operating with the Council of National Defense. It is being circulated with a view of answering the many inquiries which are being made as to what the government considers "essential" and "non-essential" business and what course is to be followed in withdrawing labor and materials from such industries as may be regarded non-essential during the course of the war for the use of such industries as are considered essential.

BUSINESS men everywhere are wondering what is non-essential business. This committee is receiving many inquiries as to the manner in which this will be determined by the government and what course will be followed in withdrawing labor and materials from such industries as may be regarded as non-essential during the war for the necessities of industries essential to the war.

No policy in this connection has been announced by the government and the above questions cannot be answered. When the occasion arises, what should be done seems clear to this committee. No action except emergency action should be taken, except in accordance with some general plan based upon a thorough survey of industry, which, no doubt, has already been made. If unnecessary hardship is to be avoided, if there is to be no discrimination, the government should not act until a general plan has been formulated and made known to the business of the country.

Before a business is classified as non-essential and deprived by act of government of labor and materials, the industry through duly elected representatives should be given an opportunity to discuss the matter, and to learn the premises of the government and the reasons for action. The motive of the government—the concentration of industrial energy toward winning the war—appeals to all, and every industry can be relied upon to assist in bringing itself into adjustment with the war needs of the country.

As has been frequently pointed out in these bulletins, if the government acts in this connection with sufficient dispatch, the industries of the country may be given an opportunity to meet the needs of the emergency in a gradual manner and after delib-

erate planning. With English experience as a guide, and with the unhesitating support which business has given to the government in the national effort, full opportunity is afforded for deliberate planning and adjustment.

Where an industry is regarded as non-essential and must be deprived of labor and materials, such deliberate planning may lead to the use of substitute materials or different processes of production. In this manner, unnecessary hardship may be avoided.

It should be a cardinal principle that the normal structure of business should be maintained during these abnormal times as far as possible. Therefore, consideration should be given to the possibility of allowing non-essential business a proportion of its requirements of labor and materials, so that some organization may be retained to be developed again upon the return of peaceful conditions.

Furthermore, when the government is forced to deprive a business of materials and labor because it is non-essential, an effort should be made by the government to place with the industry orders for product needed in the war. In this manner a helping hand may be given to business suffering solely through sacrifice for the common good. In this same connection it may be said that if men are to be withdrawn from industrial communities where they have houses and gathered in manufacturing centers already congested, there is created a great housing problem in connection with the production of war supplies. But if in placing war orders effort is made to produce war supplies in the centers where labor is housed, not only will congestion in munition centers be relieved, but there will be avoided at the end of the war the great problem of moving labor back to the normal producing centers.

One of the reasons for suggesting the formation of War Service Committees in industries was to bring about an early consideration of the above problems and to direct the attention of industries to the need in these abnormal times of preparing for diversified or unusual production to keep the industries intact during the war. Such committees could effectively present to governmental authorities the manner in which industries might conform to war-time conditions. In a democracy it is certainly far better for industries to become adjusted to new conditions by co-operation between the industries and the government rather than by compulsion of drastic and unprecedented government action.

Trucks Are the Salvation of America's Transport

Enormous Demand Exceeds Possible Production—Trucks Now Vital in Every Business—Roads Being at Last Put to Proper Use—Farmers Cannot Exist Without Motors—Railroads Assist Movement

NEVER in history has transportation in the United States been so far behind the needs of the moment. Our railroads are unable to cope with the situation and will continue to be so, for new tracks cannot be laid and new equipment built speedily, and the condition of the labor supply makes railroad expansion on a large scale unthinkable. Not all of our forms of transportation together can hope to catch up with demand till long after the end of the war, but it is possible to make the situation a little less serious by organized use of roads.

Roads can be built quickly and trucks produced speedily. Trucks properly applied can relieve the railroads of much short haul traffic, which is the most troublesome railroad proposition. To-day everyone, railroad men included, is looking to road transportation to enable the wheels of commerce to keep turning.

The world was slow to realize the immense potentiality of railroads; it has been slow to grasp the fact that the motor truck is going to affect civilization almost as powerfully.

Development May Surpass Railroads

The truck industry is on the threshold of a development which may even surpass that of railroads. The industry is in a more advanced state of development than our railroads were in the middle of the nineteenth century. This is particularly encouraging, considering that roads are none too good, which, by the way, is one of the reasons why the truck business is not increasing in some parts of the country. When the extreme importance of railroads was recognized, companies were given large grants of agricultural land, immense coal fields, boundless forests and many other valuable concessions. No such aid has been offered the truck industry, although there is every reason why it should receive as generous treatment as the railroads did in their early years.

The great point is that the truck industry has now reached a degree of growth when it is a substantial power in transportation. There are no more questions of competition with railroads. The truck is taking its place alongside the locomotive.

We are only at the beginning of scientific road haulage. Trailers have proved their worth, yet the handling of them is still largely experimental. The tractor-truck seems to be gaining a particular place for itself.

Perhaps the greatest thing that the country has grasped, mainly within the last two years, is that roads are as essential to civilization as, say, artificial light. To-day we are building roads, not to attract the tourist, but for the vital purpose of getting to our people the necessities of life.

This realization was the first essential in the greater expansion of the truck business which is now commencing. To-day we see the termination of the incubation period; the industry is fully alive.

Roads Neglected

Civilization has never made organized use of its roads since the coming of the railway. The roads are there for anyone to use how and when he likes but their adaptability to the running of trains or convoys of vehicles on schedule has never been tried for anything but military purposes. True there are a few public carriers, but their energies are mainly devoted to delivery as opposed to transport. Before many months are over we shall see convoys of motor trucks operating on rigid timetables, hauling goods over long distances and thus getting a far larger percentage of return from the money spent on roads than ever before.

Three years of war have shown the world what is possible in transportation by road, with proper organization to handle it, and this lesson is not to be lost. It has its commercial application on perhaps an even larger scale. The railroads are no longer in opposition. They see in the truck a co-operator and a helper.

Another thing which stands out as prominent in the events of 1917 is the final realization of the place of the small truck in the scheme of things. It is no exaggeration to say that the removal of converted Fords and real small trucks would bring to a standstill a major portion of America's retail delivery. In every suburb of a large town and in every small town the bulk of the light hauling is done by mechanical power. It is often done inefficiently by the use of old passenger cars, but even these allow a man to cover three times the ground he can supply with horse traction. The retail trader needs a $\frac{1}{2}$ -ton or 1-ton machine. He wants fair speed and he must have a low first cost. To such users the Ford truck, the Maxwell, the Vim, the Studebaker and the Overland deliveries, to mention just a few, are a godsend.

Then also there is the farmer, who is being com-

elled to use trucks owing to horse shortage. He can usefully employ a 1 to 2-ton outfit. He must do more work with fewer men and far fewer animals; hence the truck on the road is perhaps even more important to him than the tractor in the field.

In the coming year, if conditions permit, and there is little doubt that they will, we shall see 100,000 light trucks made by the few firms mentioned above, to say nothing of the others in the same field.

All these things have created a demand that cannot be supplied—a demand that will exceed production for years to come. Just now it is certain that every truck which can be produced will find its purchaser waiting for it. The limiting factors are materials and labor. The country is anxious to put to use many more than the factories can possibly make. The demand is for all kinds of trucks. The old line manufacturers with costly trucks of the highest quality are scheduling productions in some cases more than three times their previous record. Assemblers are ready to work night and day on all the parts they can buy. Both old line and assemblers are stronger than ever.

There has been a great change in the retail distribution of trucks. A year ago manufacturers were looking for dealers, were trying to convince dealers of the profitable nature of the truck business. To-day the boot is on the other leg, for dealers are crying for trucks, and still more trucks. The best distributors in the land are looking to the truck to fill up the gap in their business caused by the falling off in passenger car sales, not only in the cities, but

in the small towns. The farmer is the wealthiest man in America to-day. He has his difficulties, but he obtains more benefit from prevailing high prices than any other section of the community. He is still buying cars freely while the city man is holding off, but he is buying trucks too. It is a fortunate thing that the farmer's need for the truck should have come at a time when his ability to purchase it was never so great.

The whole business is on a more efficient footing. Sales principles are being better understood, factories are being improved, service problems handled better and, in fact, the personnel of the industry is getting a better grip on it. The improvement is particularly noticeable in the factories. A year ago there were hardly any plants operating on a system which could be compared with the passenger-car systems. Now there are several truck plants with progressive assembly lines and all the modern aids to quick production. This movement is only beginning.

In addition to the creation of some new firms and to the speeding up of the old ones, there has been much factory extension during the year. Pierce, with 40 acres of floorspace almost wholly devoted to trucks, has added another 100,000 sq. ft. Locomobile has increased from 9 to 13 acres. United Motors has added 20,000 sq. ft. to a previous 53,000; Republic with 25 acres of floor has added three new buildings, totalling 590,000 sq. ft.; the Grant Co., a comparative newcomer with the Denmo truck, has increased a 200,000-sq. ft. plant to 350,000 sq. ft. And so on throughout the industry.

Oakland's Improved Fan Pump

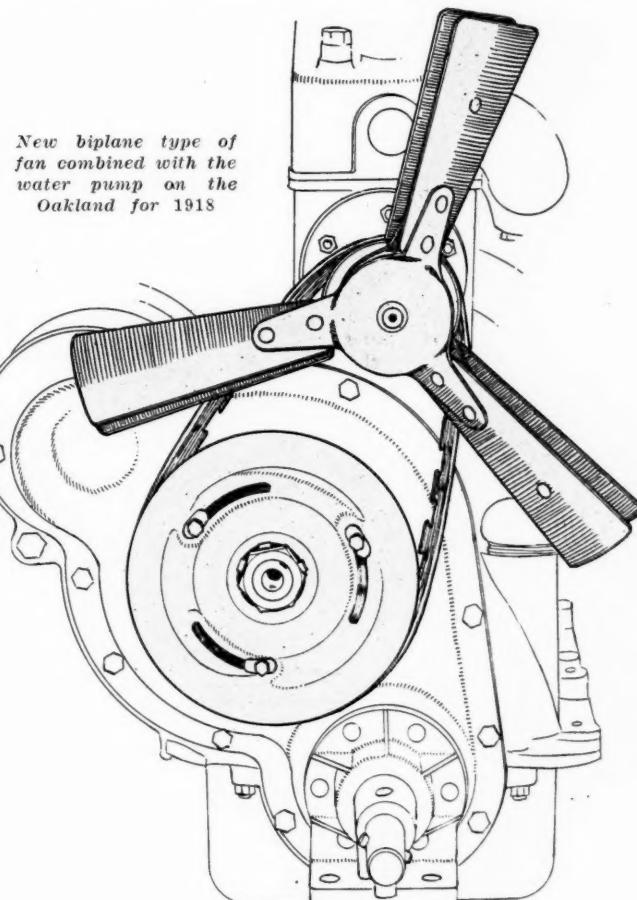
THE accompanying drawing illustrates the combination fan and water pump used on the Oakland for the coming season. This supersedes the type shown in AUTOMOTIVE INDUSTRIES for Oct. 25 on page 716. The main difference is in the improved type of fan. The former fan was a six-bladed pressed unit and the new fan is a biplane type as shown in the illustration. A feature which should be noted is that there are but three screws holding the water pump, giving a very accessible layout.

Only One Wallis Tractor

EDITOR, AUTOMOTIVE INDUSTRIES: It has recently come to our notice that manufacturers and investors are being solicited to lend their support, financial and otherwise, to the formation of a tractor company. In this solicitation, we are told, blueprints of the whole or parts of the Wallis tractor are being shown with the purpose of leaving in the prospect's mind the idea that the whole or part of this tractor is to be the product of this new venture. It is further intimated that this is with the consent of the Wallis Tractor Co.

Will you please give conspicuous notice in your columns to this denial, as there is to-day no one authorized to use any information on Wallis tractors for the furtherance of such a scheme.

J. I. CASE PLOW WORKS,
Frederick R. Pettit, Vice-President
and General Manager.



P-T Tractor Wheel Has Novel Tread

Is Provided with Swiveled Pads Instead of Fixed Lugs or Strakes—Was Originally Developed for Agricultural Tractors, But Has Also Been Successfully Applied to Military Tractors

THERE has recently been organized at Dayton, Ohio, the P-T Wheel Co. of America to manufacture a tractor wheel of Italian design for the American market. G. H. Gorman, first vice-president of the Davis Sewing Machine Co., was the promoter of the company, which owns the United States and Canadian patents on the wheel. A short account of the history of the development of this wheel should prove of interest.

In 1911, at the World's Fair in Turin, Italy, there was exhibited a small self-contained motor plow, which attracted considerable attention on account of its radical features. This machine was designed to meet farming conditions in Italy, which call for deep cultivation. In Italy intensive cultivation is the usual practice, and the fields are small and cut up by hatches and ditches.

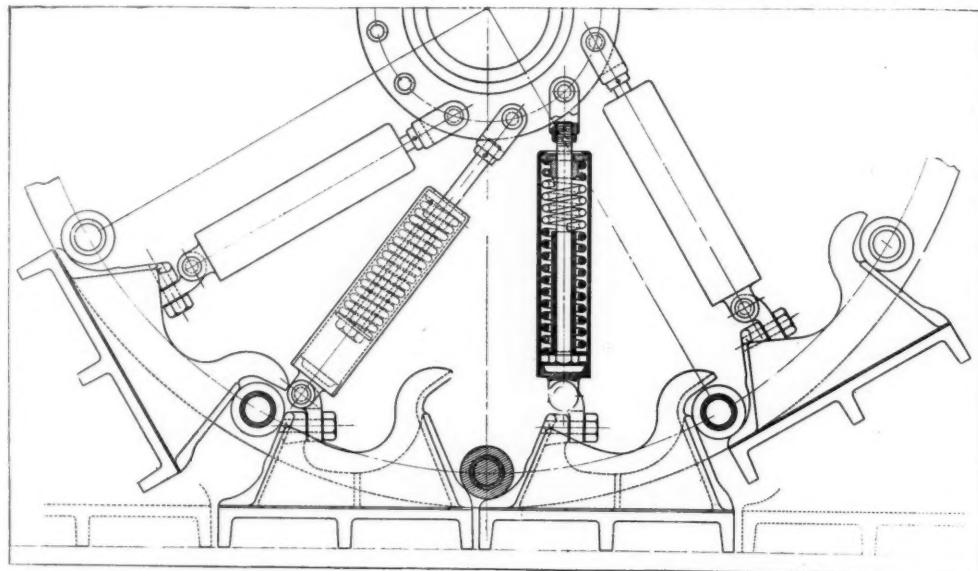
Inventors with Fiat Co.

The practical success of this machine was such that the inventors, Messrs. Pavesi and Tolotti, engineers of the Fiat company of Turin, succeeded in raising sufficient capital to develop the invention commercially, especially for the South American market. A factory was erected in Milan and actual production begun in 1912. At present this factory employs 650 men and has its own foundry. The chief factor in the success of the Pavesi-Tolotti tractor was its single driving wheel, known as the Pavesi-Tolotti spade wheel. This wheel was fitted with 12 wide and deep spades that were operated from an eccentric on the axle through the intermediary of strong links, in such a way that the spades would enter the ground almost vertically, remain vertical for some time and then be drawn out in practically the same direction. In this way the spades gave a very powerful grip without any great loss of power due to scraping of the soil. By turning the eccentric

through an angle of 90 deg., by means of suitable levers, the spades were kept within the outer diameter of the wheel, thus permitting of driving the machine over hard roads.

Started Before War

When the war broke out Pavesi and Tolotti were far enough along with their manufacturing enterprise to enable them to undertake for the Government the construction of a special type of military tractor for hauling heavy loads over all sorts of surfaces. For this tractor they developed an entirely new type of driving wheel, known as the P-T pad wheel, which is quite different in construction from the tractor wheel. The spade wheel was designed to secure traction by means of members actually penetrating into the ground, while the pad wheel is designed to secure traction through the friction of a series of pads arranged to grip the ground successively as the wheel rotates. These pads are not operated by an eccentric or other mechanism and are not even pivoted to the rim of the wheel, but are merely held against it by tension springs, so that the wheel can



The latest type of P-T wheel, the finished article being shown below

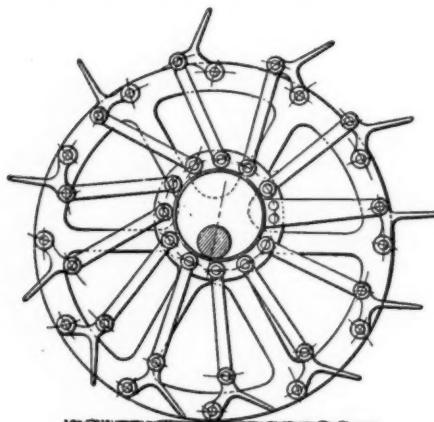
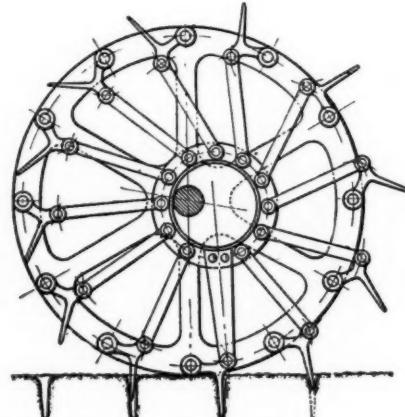
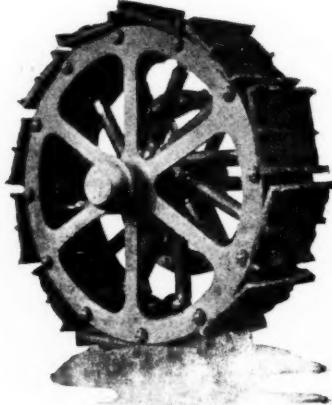


Diagram of original P-T wheel as smooth tread and non-slip type



P-T pad wheel



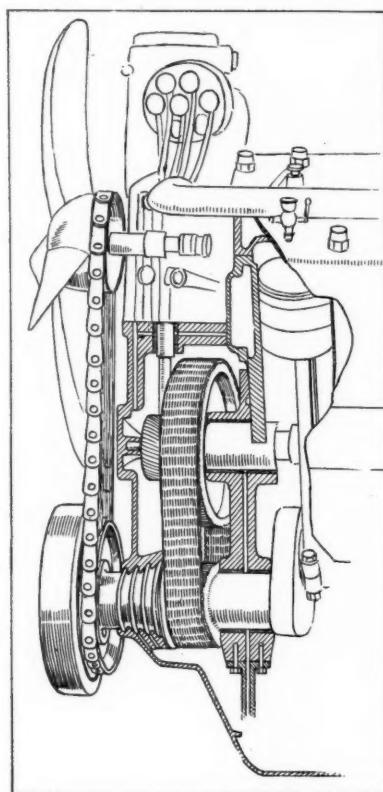
roll over them without causing them to move relative to the ground. This is due to the fact that the pads are free in the circumferential direction and are each provided with two thrust surfaces corresponding to the involute curves described by a number of rollers within the wheel. These rollers are constantly in contact with the thrust surfaces of the pads, and in this way the power is transmitted, the friction of the pads on the ground being sufficient to prevent slippage of the wheel.

The first military tractors built for the Italian army by Pavesi and Tolotti were fitted with compound or double wheels, the object being to insure sufficient traction under

all conditions of operation on both roads and fields. These first tractors were intended chiefly for hauling heavy guns and ammunition. After a year of war, and as a result of the experience gained from it, the Italian officers and inventors found that they could obtain practically equal results with plain pad wheels made of larger diameter and wider, so an improved type of military tractor was brought out by them.

The double-wheel tractors had driving wheels 95 cm. in diameter, with pads 25 cm. wide and spades 16 cm. wide, whereas the latest type of tractor has wheels 120 cm. in diameter with pads 30 cm. wide.

Adjusting Lanchester-Packard Vibration Damper



ILLUSTRATING THE LOCATION OF THE PACKARD VIBRATION DAMPER, WHICH IS CARRIED ON THE FAN PULLEY

cylinders such as 1 and 5, or between cylinders 2 and 6, is just the same in the six as in the twelve, and consequently the benefits of the vibration damper in the six-cylinder engine would naturally apply to the twelve-cylinder engine in checking torsional vibration.

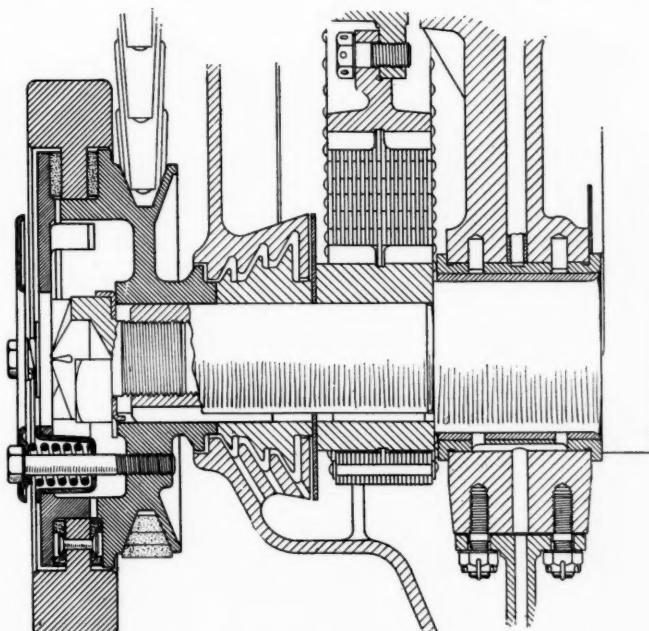
Whenever one cylinder fires, the energy traveling down the connecting-rod to one of the cranks is imparted directly to one point on the rod. From a theoretical standpoint that spot is the center of pressure of the crank bearing. The crankshaft receives an impulse which may be considered to be centered at that point and every other part of the shaft, and all that is attached to it is carried along momentarily by the effort which the shaft has received at that point.

Naturally there is a tendency for every other part of the shaft to lag behind this point due to the laws of inertia and the other laws of dynamics and mechanics of materials. When this is followed by an explosion on the other side of the center of the shaft, namely, from some cylinder removed some distance from the point of the first explosion, the part which once carried the load

is in turn the part that tends to lag. In other words, each crank center first tends to advance before the rest of the shaft and then tends to lag behind it.

The damper arrangement is attached to the fan pulley which is keyed on the end of the crankshaft. The damper proper is a flywheel, which is not connected positively to the fan pulley, but by means of a spring and friction material arrangement which makes it virtually a slipping clutch. At normal speeds there is no slippage between the flywheel and the fan pulley, but when the critical speed is reached where the torsional vibration comes into effect, the slippage takes place, having the effect of breaking the period of the vibration and checking its tendency to build up due to successive oscillations.

In setting the vibration damper, the nuts holding the spring retainers which adjust the amount of friction between the fan pulley and the flywheel are tightened until the damper will not slip until a pull of approximately 140 lb. is exerted. To check the frictional resistance in the service station, the fan belt is removed and a clevis is attached to the damper wheel, using one of the two 5/16-in. holes in the rim of the wheel. The engine is cranked by hand until the clevis has passed the horizontal center of the crankshaft. A spring scale is then hooked to the clevis and the stud springs adjusted so that it requires a pull of 140 lb. to slip the wheel when the scale is pulled at right angles to a plane through the center of the clevis pin and the center of the crankshaft.



SECTION THROUGH THE PACKARD VIBRATION DAMPER MOUNTED ON THE END OF THE CRANKSHAFT

Creeper Tractor Ancient Invention*

Idea Originated Before 1770—Many Patents Taken Out
 Early in Nineteenth Century—Early Designs Based on
 Railroad Track—Many Complicated Pedrail Devices

PROBABLY most engineers have the idea that the creeper tread, which was really commercialized by the Holt caterpillar tractor, is a comparatively new idea, but research soon shows this to be a vastly mistaken impression. In a book published in England by C. F. T. Young in 1860 a long list of patents appeared dealing exclusively with this subject, and the first patent mentioned was granted to R. L. Edgeworth as early as 1770. This was for a machine which carried rails which it laid in front of itself and continuously picked up and relaid. There was a series of attempts recorded through the next half century, one which seems to have appealed especially to inventors being the attachment to the rim of a wheel a number of tangential steel spring plates. These plates bent to the curvature of the rim of the wheel as the latter revolved and straightened themselves out again automatically.

Apparently the original patent on this system was granted to James Neville of England in 1827, but it was repatented later by another Englishman and by (curiously enough) Henry Ford, an American, in 1830.

The first real track layer, however, seems to have been a much later idea, being patented by James Boydell in 1846. In this the wheel carried a number of lengths of wood, each bearing a section of steel rail. The wooden pieces were carried on a mechanism similar to that of a "feathering" paddle wheel for marine work, and the arrangement was such that each piece was placed flat on the ground before the wheel reached it. The ends of the wood sections were cut at an angle, so as to transfer the weight gradually from one section to the next with-

out shock, which means that two adjacent sections were flat on the ground simultaneously for a short period. According to Young's book this Boydell idea was the only practical one to date—1860, that is. The Boydell engine was actually used and is recorded by Young as having been satisfactory.

The Dunlop Inventions

Whether or not he was stimulated by Young's book is not recorded, but starting in 1861 Andrew Dunlop of Glasgow, Scotland, took out a number of patents for pedrail wheels, about the best being dated 1874. As shown in the drawing, it was a complicated structure, but Dunlop had a good idea of what he was trying to do and his wheel should have been fairly efficient, if clumsy and hard to lubricate.

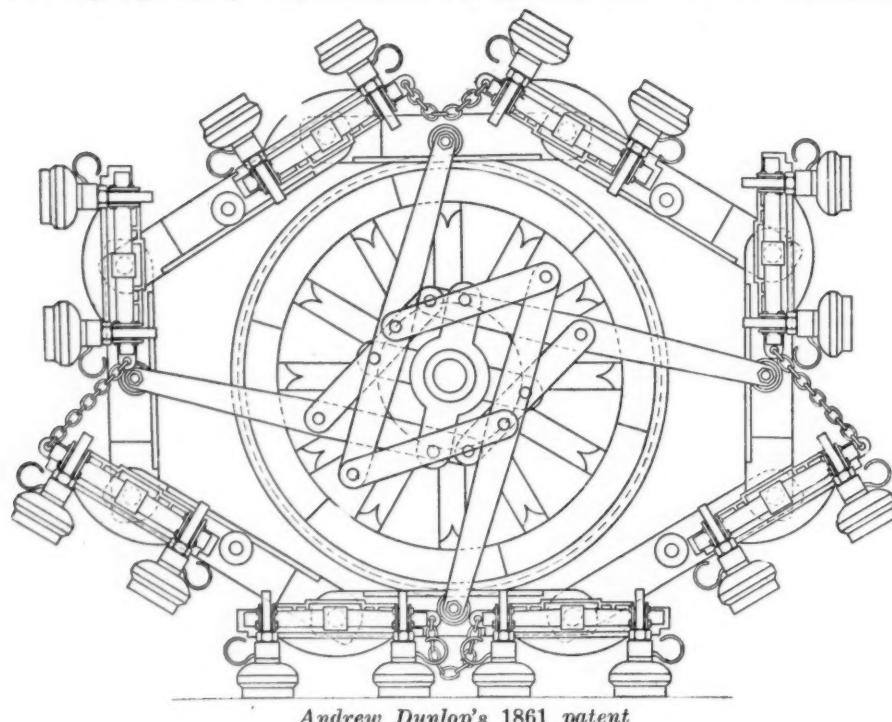
There were to be eight or more "rails" surrounding each wheel, these rails being jointed together in such a manner as to allow them to bend round the wheel as they were laid on or lifted from the ground, and also to bend laterally at the joints when the vehicle was turning round corners or in a circle. Each wheel was made up of three separate wheels. There was first of all a central wheel *A*, with comparatively narrow rim arranged in between two other wheels *B* and *B'*, with much wider rims.

This central wheel was keyed to the axle, and had spear-shaped, or as the inventor himself called them, "tooth-like" projections, *A'*, *A'*, *A'*, arranged at regular intervals round the periphery. These projecting teeth worked in between two bevelled cross-bars, *C* and *D*, which reached from side to side of adjacent links of the

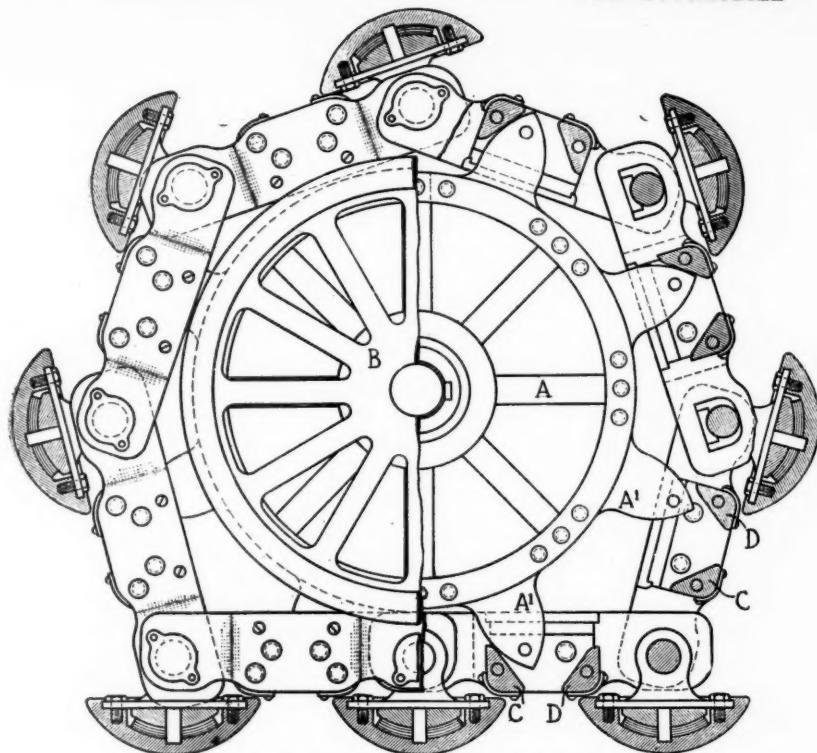
rails, and they acted exactly as do the teeth of a sprocket wheel, arranged to engage with a chain. When, therefore, the wheel was revolved the series of rails was also made to revolve. The two outer wheels were free on the axle, and they were arranged to roll on the rails, being furnished with outside flanges which embraced the former. The rails were fastened together in an endless chain as in the earlier patent, and at each joint there was also pivoted a rounded or flat foot.

First Chain Tread South American

Something much more like the Holt caterpillar was patented in 1882 by Guillaume Fender of Buenos Aires, in fact his idea had all the essentials of the chain tread creeper. The idea is shown in the



*The data from which this article was written, and the illustrations, are taken from *The Engineer*, London, which published a series in issues from Aug. 10 to Sept. 14, inclusive, this year.



Dunlop's later idea patented 1874

cut as it appeared in the patent specification, and it needs a little explanation. The polygonal wheel in front was to be a drum the full width of the tractor apparently, and this was the steering wheel. There was a smaller or similar drum at the other end to lift the chain, and the vehicle ran on the intervening portion. It is presumed that one or more of the small wheels resting on the track were to supply the drive. These wheels, it is stated, could be formed with teeth to engage spaces in the chain.

G. F. Page of Baltimore in 1884 patented a drive with two chains, Holt fashion, but he had only four wheels, two of which drove. The main interest of his invention was that he proposed to steer by twisting the front wheels and so leading the chains aside from their straight path.

There were also several inventions about this period wherein a chain was brought from a driving sprocket on the frame of the vehicle and simply taken around the driving wheel, which it both drove and supported, the wheel running forward onto the slack side of the chain.

One of the most complete ideas was that of F. W. Baxter, an American, who secured his patent in 1888. It will be seen in the cut that there are two sets of endless belts, one set being arranged on each side of the vehicle. The outer belt—that which impinges on the ground—is composed of shoes arranged transversely and coupled together. These belts pass over hexagonal pulleys, two at each end of the vehicle, the forward of which is driven from the counter-shaft of the engine. In contact with these outer belts, and coming between them and a series of rollers arranged along the top and bottom of the frame of the machine, are

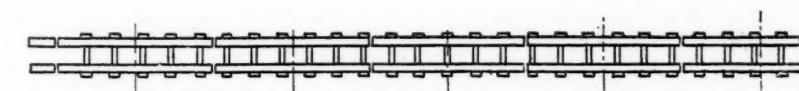
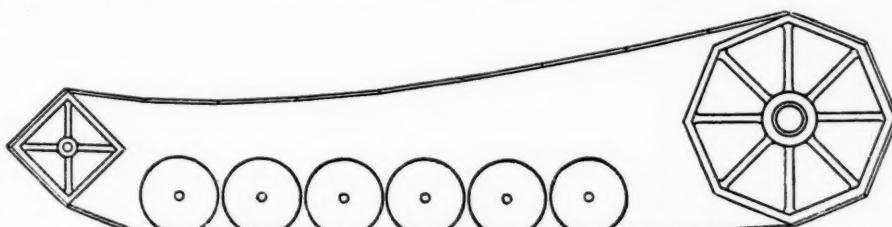
two other endless belts—one on each side of the machine—these revolving on square pulleys, and being of much less width than the shoes of the outer belt, which are formed of blocks of wood, and which have a considerable length transversely in order to provide a sufficient bearing for the machine on soft or yielding ground.

The two chains of shoes are independent of one another, being driven separately. The inventor does not claim any particular method of connecting the shoes together, simply saying that the form of link or joint must be such as will allow the belt to turn freely about the polygonal pulleys or rollers. The links of the inner chains were to be united by pins, so that the links might rest on the middle portion of the blocks or shoes of the outer chains. The anti-friction rollers on the under side of the frame are arranged close together and are alternately flanged and plain, this method being chosen because, while the alternate rollers with flanges keep the whole row in place upon the links of the chain, the fact that the alternate rollers are without flanges permits of a greater number being got into the same length than would be possible if all were flanged. The inventor's idea was that

since the shoes of the outer chains were of considerable length, while the links of the inner chains were comparatively narrow, the former might adjust themselves to irregularities of the ground, but the working of the rollers would not be interfered with. The arrangement of the steering wheel is to be noted, there being two sets of double wheels so connected that the two sets slewed together. It will be observed that the employment of these wheels, besides rendering steering possible, results in the lifting of the end of the chain off the ground, so that both ends are held clear of it.

Needed Differential

It is very obvious from studying these early designs that the inventors were handicapped by lack of knowledge of the differential and its functions. It seems curious in the light of later knowledge that none of them seem to have thought of the idea of driving one chain faster than the other for the purpose of steering, since this could be done without a differential. A slipping clutch which

The first real creeper invention,
patented by G. Fender in 1882

November 8, 1917

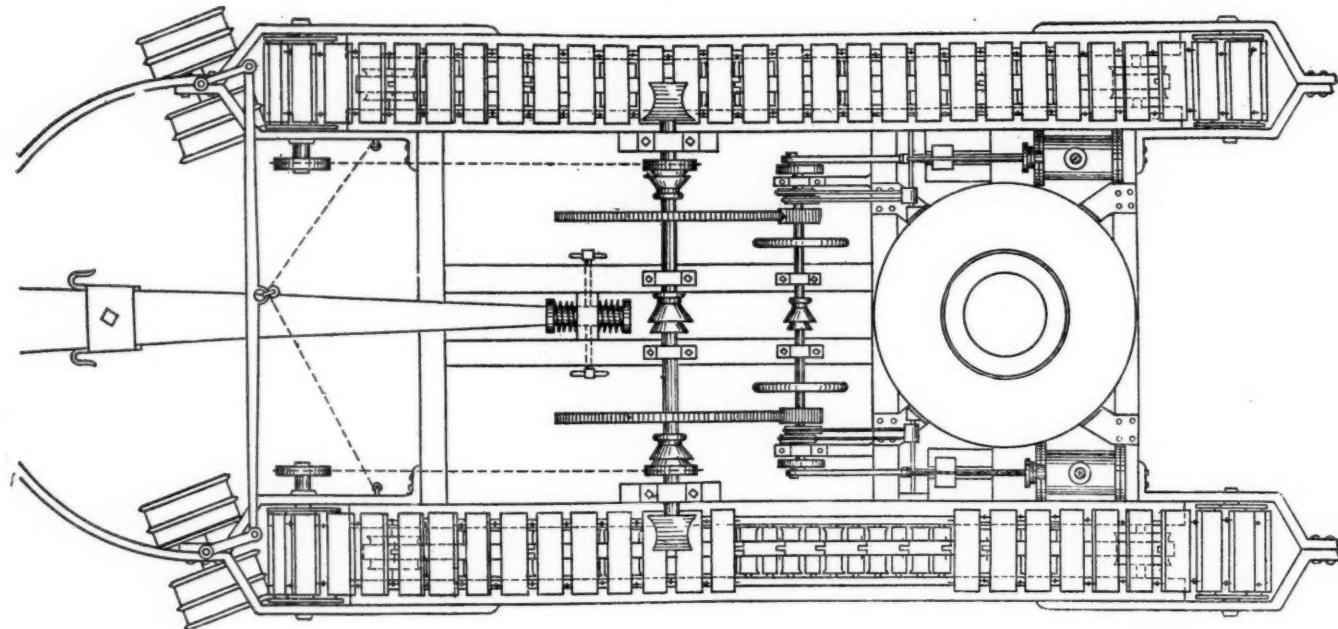
would release the drive on one side or another would have performed much the same function, and there was plenty of knowledge of clutches at that time.

In 1890 another American, G. H. Edwards, obtained a patent for an elaborate machine which looks much more like a modern creeper. This was, of course, a steam tractor, and the noteworthy point was that the inventor had two frames. The upper carried the engine and was free to move relative to the chain treads, there being a hinged connection between the two. This meant that the load was partly carried by the treads and partly by the steering wheel, which was separate, the creeper platform being used as a driving member. Practically the same construction is seen to-day in the Bates steel mule, for the creeper part thereof is free to oscillate without disturbing the equilibrium of the whole machine. Edwards made special claim that his device would enable

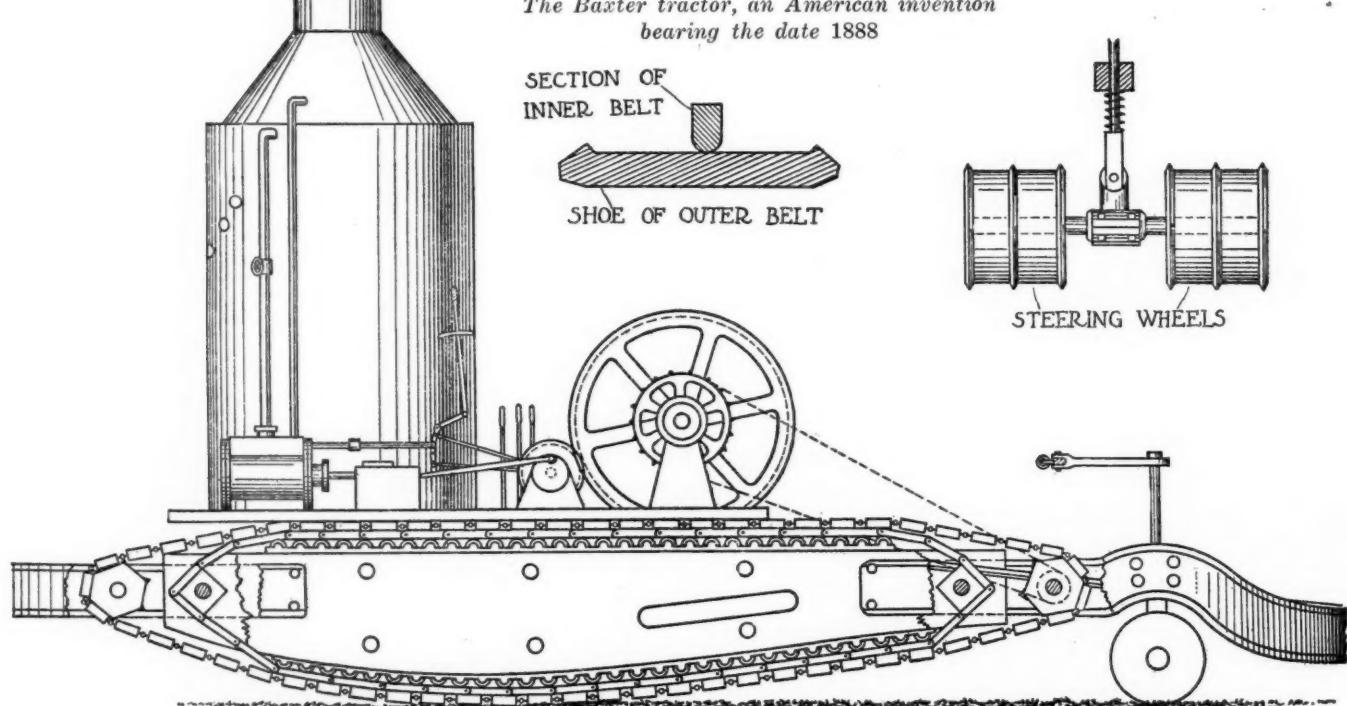
the load on the steering wheel, and hence its power of directing, to be maintained approximately constant even over rough ground.

With this date, 1890, there can be noticed a distinct change in the character of the inventions. It was then getting easier to obtain experimental models of machines and easier to interest people with money in the tractor idea. One must not overlook, however, the idea of W. Gwinnett of England, in 1895, although it is more amusing than constructive. Gwinnett had no wheels, but used a "slipper" in the form of a flat-sided oval. Around this ran the chain on huge steel balls, and the drive was to be applied to the top of the chain. The inventor naively suggested that a pneumatic tire should be wrapped around the whole circumference of the chain.

(To be continued)



The Baxter tractor, an American invention bearing the date 1888



New Truck Has Air Suspension

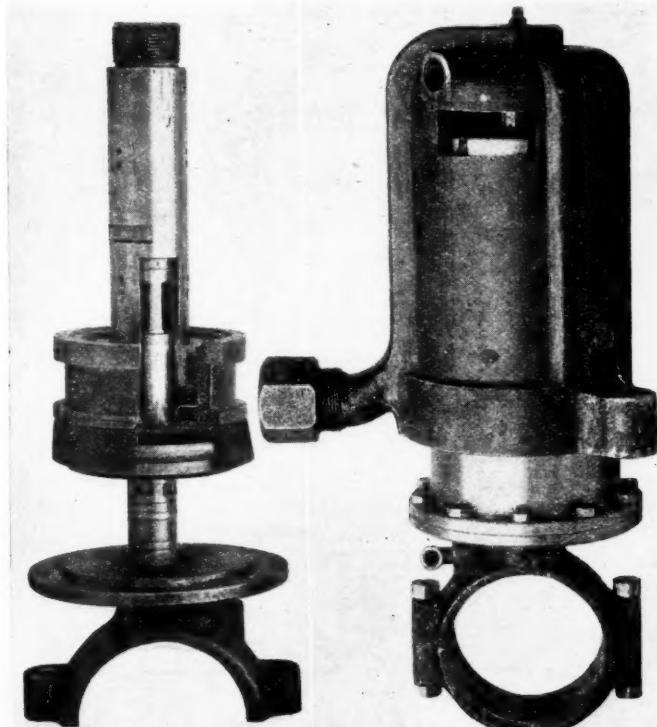
Adjustable Pneumatic Springs Care for Variations in Load—Pressure in Four-Cylinders Equalized from Central Air Tank

THE Air-O-Flex Automobile Corporation, of Detroit, has developed a new type of body suspension, and will soon start production on a truck in which this type of suspension is a feature. Springs are dispensed with completely, and in their place are four telescoped cylinders which contract and expand on a body of air and oil, each cylinder working independently and operating against the pressure of a central equalizing tank. The advantage of this system is that the pressure on the cylinders may be adjusted from the dash to counterbalance the load and road conditions.

One of the cylinders is attached at each corner of the truck frame, connecting it with the axle, and an oil lead from each is connected with the central equalizing tank containing common cylinder oil and air under pressure. A small engine-driven pump provides the initial pressure, and a regulating valve on the dash permits the driver to set this pressure for quarter, half, full or overload, and to meet the road conditions.

A ball-and-socket joint permits freedom to the individual cylinders at their point of attachment with the axle, and the upper parts are pivoted to the frame on brackets. This provides a full universal action, and removes all side stress from the cylinders.

The drive is taken through the usual radius arms, and cross or side sway strains are taken through a cross radius rod on the rear axle assembly. At the front, however, a set of flexible radius rods, resembling the main leaf of a conventional spring, is used. These in no way carry any of the load, only caring for side sway and

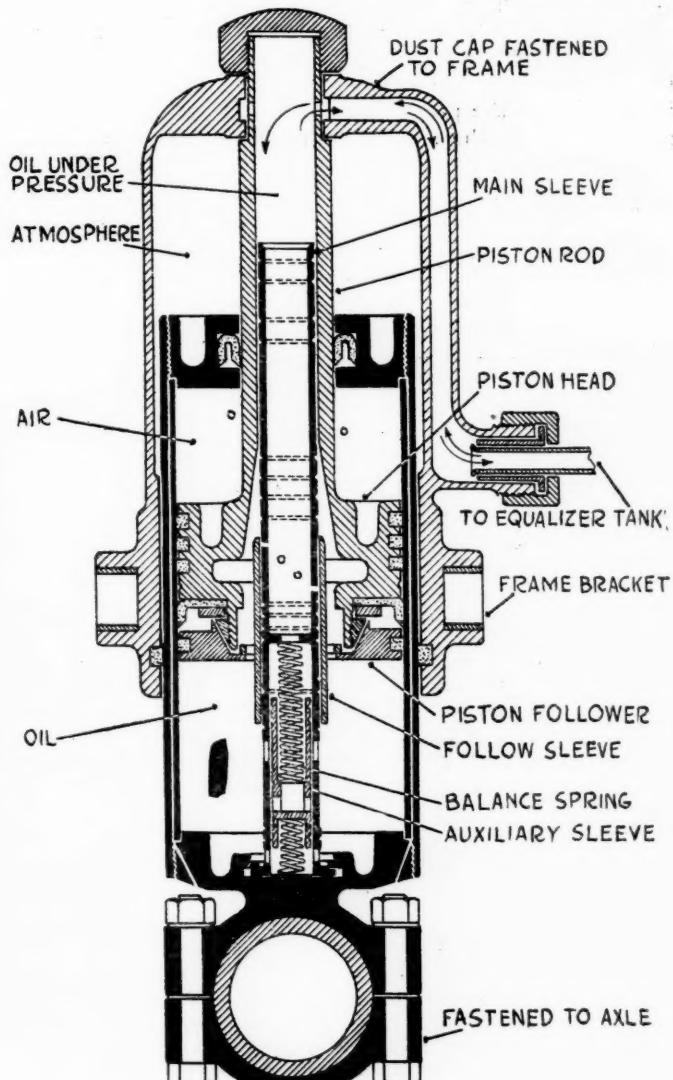


Details of the Air-O-Flex suspension

fore-and-aft stress, the cylinders in all cases supporting the load, but being free from other influences.

On this page is shown a section of one of the suspension cylinders in normal running position. In this position, the follow sleeve has closed the main ports, and rests on the shoulder of the piston follower. Likewise the upper ports in the main sleeve are closed by the auxiliary sleeve, and the pressure under the piston and in the central equalizing tank is equal.

When the cylinder fastened to the axle is suddenly displaced upward, as when striking a bump, the pressure on the oil beneath the piston is increased, discharging the oil through the lower auxiliary ports, driving the auxiliary sleeve upward against both the pressure in the equalizer tank and the balance spring until the ports of the auxiliary sleeve register with the ports in the main sleeve. Hence the first displacement of the oil is into the main sleeve through the lower auxiliary ports;



the secondary displacement being through the lined-up ports of the main sleeve and the auxiliary sleeve, directly onto the equalizing tank pressure.

The follow sleeve has not moved during this displacement, due to a film of oil between it and the main sleeve, until the piston has moved downward $\frac{3}{8}$ in. At this point the shoulders on the piston move the sleeve downward, first opening one of the main ports in the main sleeve and then starting to close the auxiliary ports on the main sleeve. This action continues, the main ports opening and the auxiliary ports closing as the piston moves downward, until all the main ports are open. They then begin to close, with continued piston travel, and when the piston is within $\frac{1}{2}$ in. of the bottom of the cylinder, all ports are closed, preventing a metal-to-metal contact.

The Method of Action

The cushioning action is caused by three things, first by the squeezing of the oil out through the ports, against the pressure of the equalizing tank; second, by the fact that the oil in the cylinder is filled at all times with numberless air bubbles, from the air pump, which act as minute cushions and provide resiliency for an otherwise incompressible liquid; and, third, by the fact that the air above the piston is compressed on the down stroke and expanded on the up stroke, creating a further dampening effect to shock action.

When the cylinders are expanded, as when one wheel drops into a hole, all ports are closed, cutting off the connection with the equalizing tank. A degree of vacuum, according to the amount of displacement, is created between the oil in the cylinder and the piston, and this, together with the pressure built up by the air above the piston, absorbs the shock and regulates the rapidity of downward travel.

Standard Units Used

The resiliency is the result of pressure and vacuum working in unison, the pressure on the oil coming from the equalizing tank. And this may be regulated to operate from 40 to 100 lb. per sq. in., depending upon the load and nature of the road.

The specifications of the first model, a $1\frac{1}{2}$ -ton general utility truck, show standard units throughout. A Continental $3\frac{3}{4} \times 5\frac{1}{4}$ -in. engine, Warner gearset, Borg & Beck clutch, Spicer universals, Timken front axle, Russel internal gear rear axle, Stromberg carburetor, Bosch ignition, Duplex governor, are included. The price, with cab, is \$1,700.

From Gas to Petrol in the Antipodes

WHILE in England owners of commercial vehicles are turning to the use of coal gas owing to the scarcity of gasoline, users of gas engines in Australia are preparing to take the reverse step. Says the *Australian Motorist*:

"In view of the possibility of gas being cut off in Melbourne, users of power are changing from gas power to petrol or oil fuel. A 50-hp. Crossley Brothers' engine at present using gas, of which 800 cu. ft. per hour are consumed, has been changed over for petrol. 'Kingston' carburetors are being used; they are the largest size obtainable. The fuel used will be Plume benzine. It is estimated that about a case per day will be consumed. The petrol tank will be placed on top of the cylinder, and connected through a T-piece, to which is fitted the two carburetors, the mixture passing to the cylinder through a Y-shaped coupling. No trouble is apprehended in obtaining from the petrol the same result as with gas. The engine is, of course, governed, and the usual setting is to cut out on four out of five cycles. Two carburetors are needed, as the horsepower is so great."

Automatic Radiator Heater

A HOT water heating system for motor cars, operating from an individual gasoline burner, is being manufactured by the Underhood Motor Heater Corp., 705 Book Building, Detroit. This heater may be attached to any car, and takes the water from the base of the radiator, heats it, passes it through the water jacket, and if desired, through a heating radiator in the passenger compartment, and then returns it to the radiator.

The heating unit is attached to the side of the engine through brackets that are held in place by studs already on the engine. This unit comprises a special gasoline burner, placed beneath a heating coil, and both surrounded by a sheet metal shell with an inner lining of asbestos.

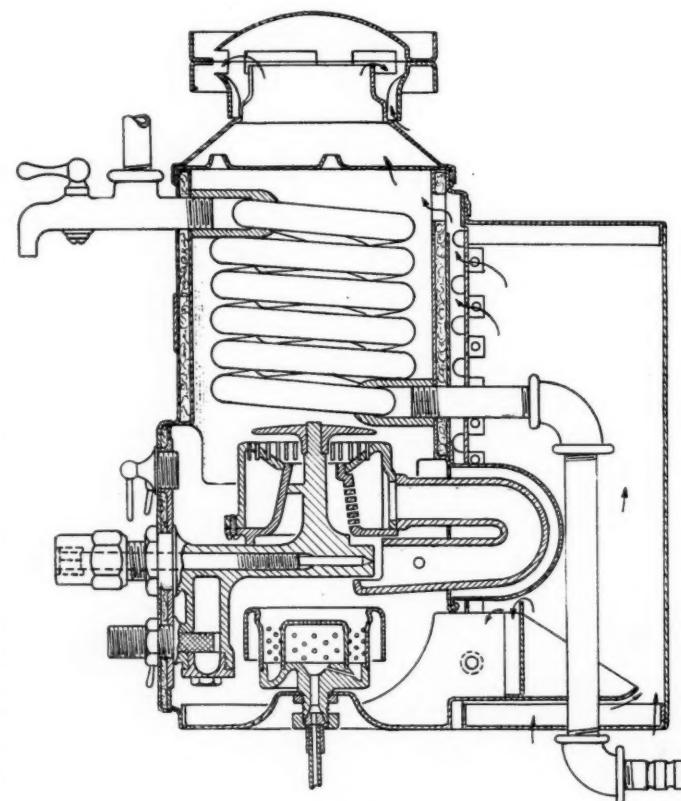
Gasoline is fed by pressure from a separate steel tank, and the amount reaching the burner is controlled by a key operated needle valve. The burner is of the vaporizing type—that is, the gasoline is passed through a heated pipe, and is broken up into a hot vapor before being mixed with the air, and burned.

Heating Coils Protected

Both burner and heating coils are protected by a sheet metal container, at the side of which is mounted an air chamber, or breather. The purpose of this chamber is to break up the incoming air currents, to supply the burner with the necessary amount of air, and to exclude the entrance of any foreign substances.

The air enters through a gauze, strikes a baffle plate, and is deflected into the chamber. Ports around the burner chamber allow all air required for the burner to be drawn in as necessary, the excess amounts passing upward and out at the top of the heater. This arrangement permits the burner to operate under all running conditions as satisfactorily as though it were in a quiet room.

The water supply is drawn from the lowest point in the radiator and passed through the heating coils, where it is raised to any desired temperature, and passed either to the water jackets or to the heating radiator in the passenger compartment, and thence back to the water jackets and radiator. A heater of this type can be used to advantage for heating up the engine of a car stored in an unheated garage.



Underhood radiator heater

Unusual Material in Riker Truck

Cost a Secondary Consideration in Design and Manufacture—Special Steels Used Lavishly—Rigidity Sought in Frame—Engine Has Bronze Crankcase

THE Riker truck, made by the Locomobile Co., Bridgeport, Conn., is one of those all too rare machines which are designed and built first and priced afterward. Durability, which is the invariable result of very careful engineering and the use of the highest possible grade of material, is a quality well worth paying for in heavy duty machinery, and a truck must certainly be classed as such.

In the design of the Riker truck there is nothing radically different from the accepted standards of best practice, yet a glance at the chassis shows that it is the result of elaborate care in the construction of each detail. It is not easy properly to distribute rigidity and flexibility throughout a truck chassis. It is essential to allow for distortion, but there are many different ways of doing so. In the Riker a particularly close study has been given to what should be rigid and what flexible. Consequently the truck rides very well and stays tight at the joints; it is a quiet operating job, as trucks go.

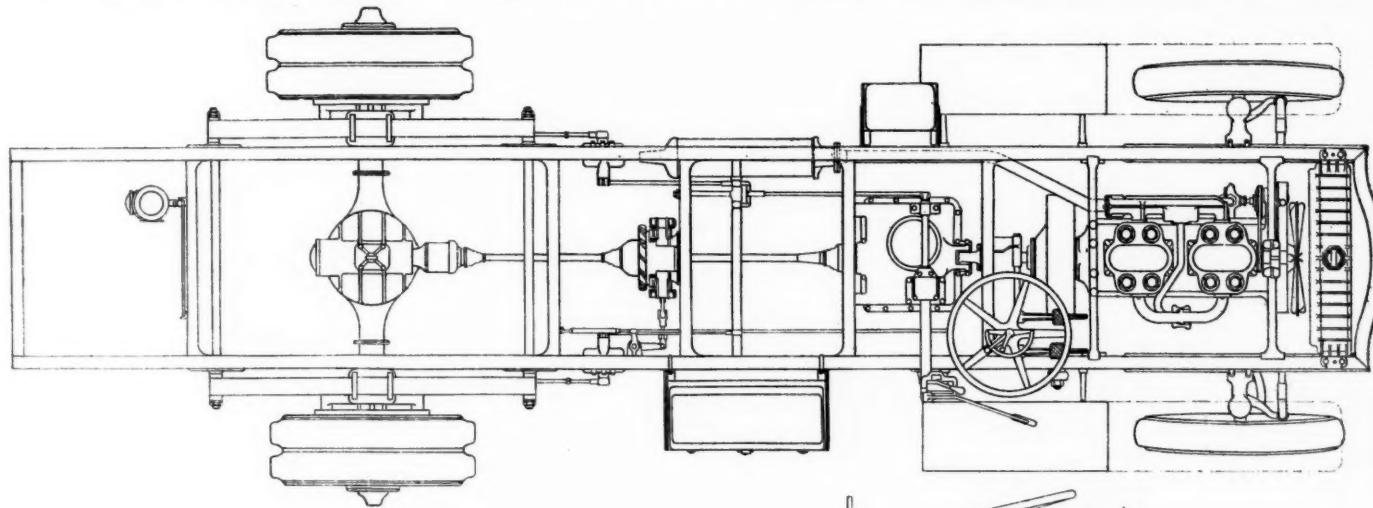
Rigidity in Crankcase

In both engine and transmission it is to be noted that exceptional rigidity is present, while the method of suspension in the frame gives complete freedom of movement. Following a habit of many years' standing with the Locomobile Co., the crankcase is bronze, and five

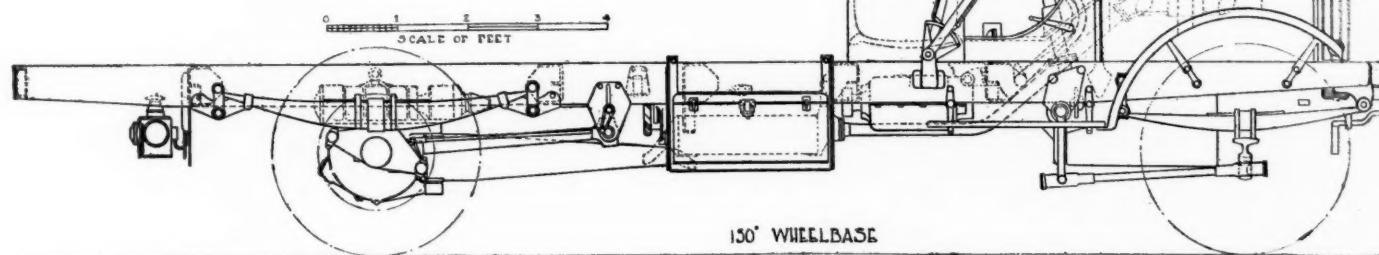
bearings are used on the crankshaft. The bronze case is a little heavier than aluminum would be, but it is much stronger. The division of the five shaft bearings is also unusual, in that the front and center bearings are nearly as wide as the rear one, the idea being to stiffen the shaft at the points where the inherent bending moment can best be resisted. The first and third intermediate bearings help to take the direct loads of the explosions and the inertia stresses of the pistons and connecting-rods, but are of little value in counteracting bending stress.

Incidentally, the crankshafts are all balanced on a running balance machine as well as the flywheels, the pistons are matched for weight very carefully and the connecting-rods are not only selected in this way but are tested and again selected for the position of their center of gravity. The result of the inherent rigidity of the design coupled with the extreme care in selection gives an engine which runs as smoothly as a four cylinder of such size, $4\frac{1}{4}$ by 6 in., can very well be made to do. Smoothness of running is also helped greatly by the Locomobile practice of checking the size of each combustion space and correcting inaccuracy within fine limits.

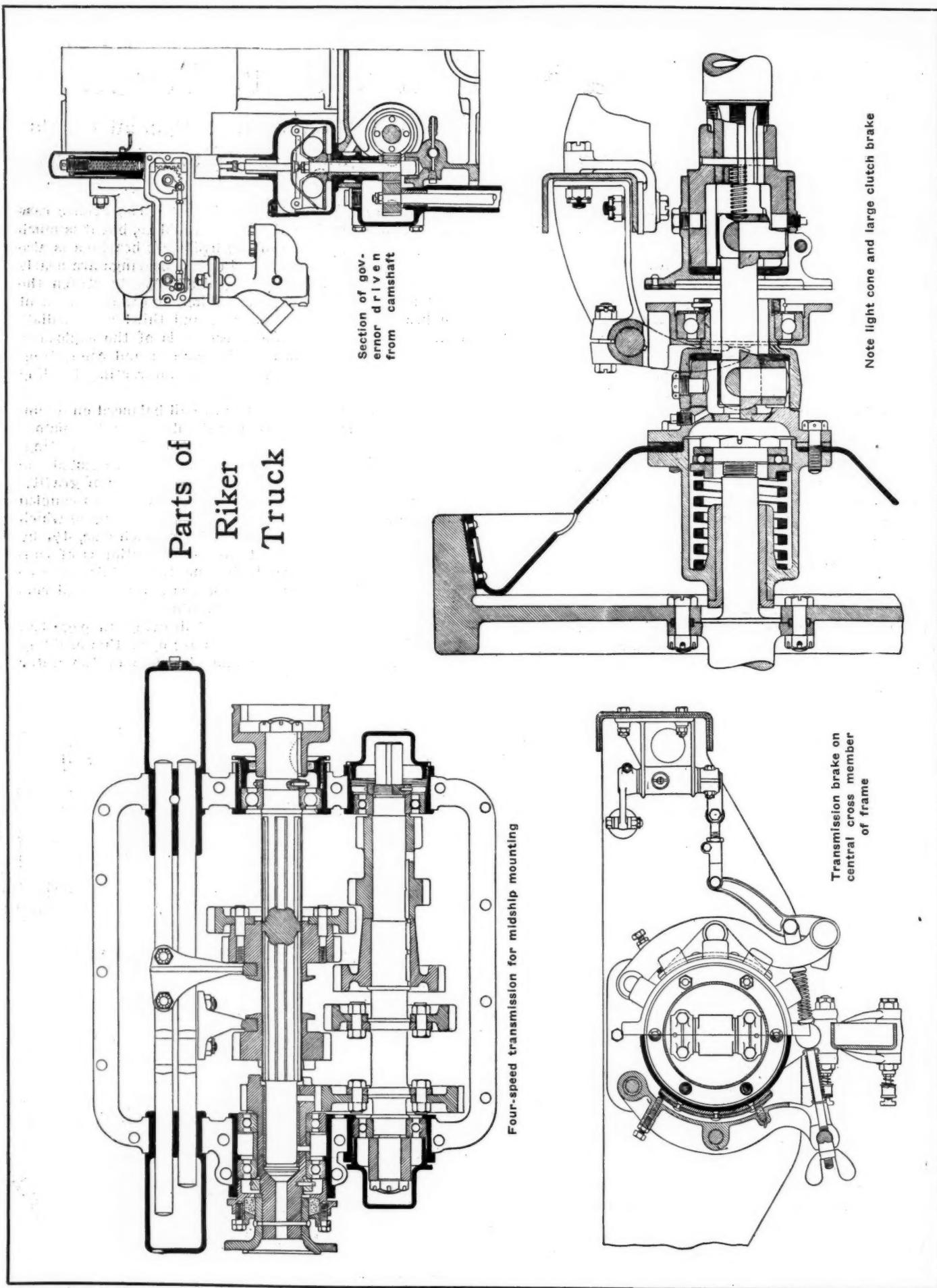
It will be seen in the sectional drawing on page 832 that the tops of the pair castings are open, this enabling the nature of the castings and clearness of the water



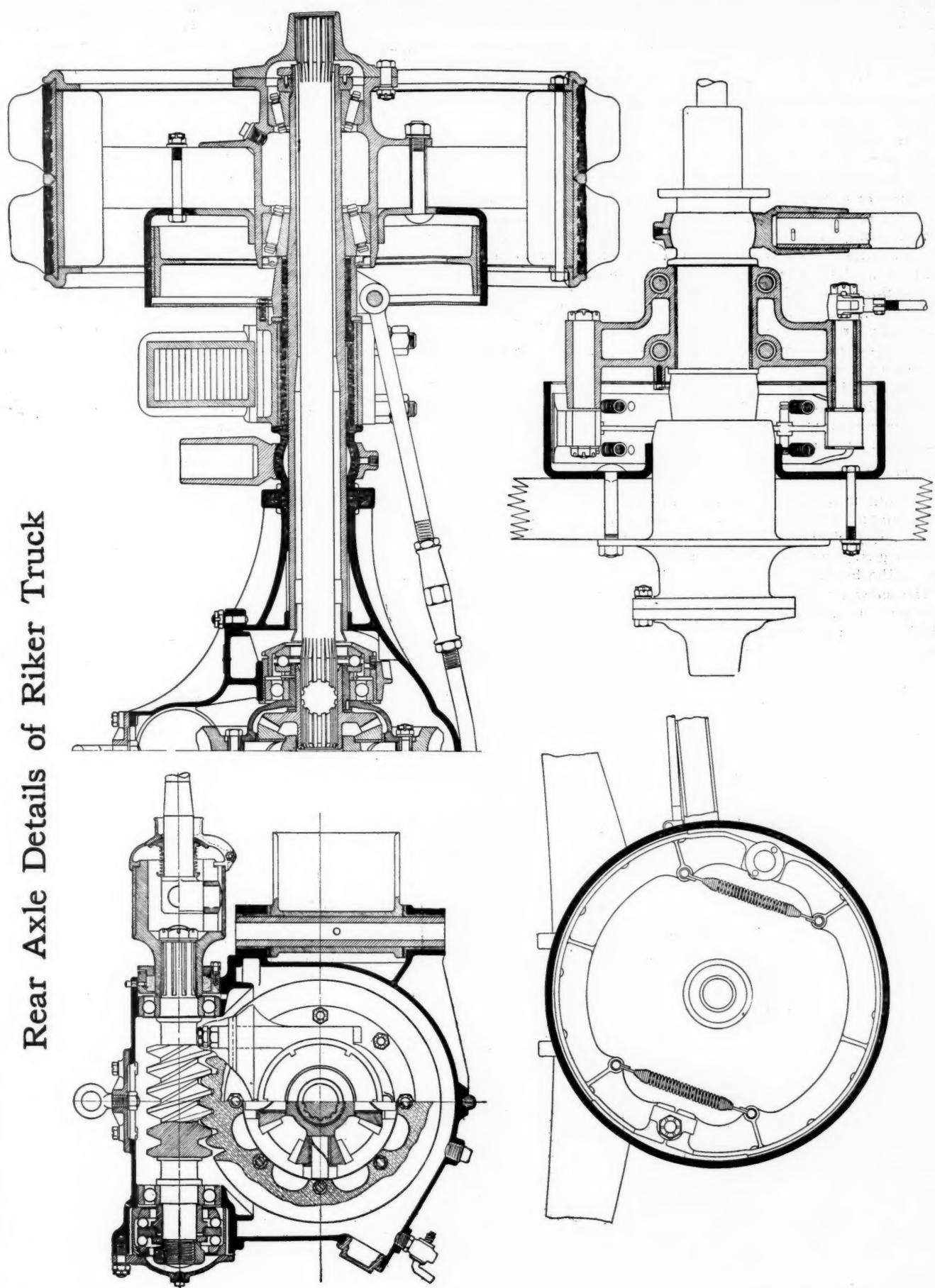
Chassis of Riker Truck



November 8, 1917



Rear Axle Details of Riker Truck



space to be checked. In the transverse section on page 833 the amount of water around the valve pockets should be observed, especially the way in which water is carried up so as to completely surround the valve cap. Valve caps are prolific sources of hot spots, since they contain considerable masses of metal, and the proper cooling of the caps is more than ever important with present grades of fuel. A neat detail of the cylinder construction is the way in which the priming cocks are used to secure the cylinder headers, which are bronze castings.

To guard against leakage of fuel to the crankcase, the pistons are nearly 50 per cent longer than their diameter, and carry four rings at the top. There is also a scraper ring, as a very copious amount of splash lubrication is employed in addition to a pressure feed to the main crankshaft bearings. To cut down the amount of oil reaching the cylinders there are baffles slotted just wide enough to admit the connecting-rods at the foot of each cylinder. Although of one piece, T-head construction, the cylinders are comparatively easy to remove for carbon scraping, and the T head is, of course, ideal for cleaning by the burning-out process. The roller tappet guides attach to the crankcase and are undisturbed by cylinder removal. The valves are completely inclosed by aluminum covers.

Outside Oil Pump

Gearing is simplified by an ingenious combination of oil pump and governor drive. At the center of the intake camshaft, just behind the carburetor position, there is a skew gear, and this drives the governor pinion, which lies in the horizontal plane.

The skew gear being also able to operate as a helical spur gear, meshes in turn with the oil-pump drive pinion, which is thus brought well out from the camshaft. Its bearings are housed in a detachable casting on the side

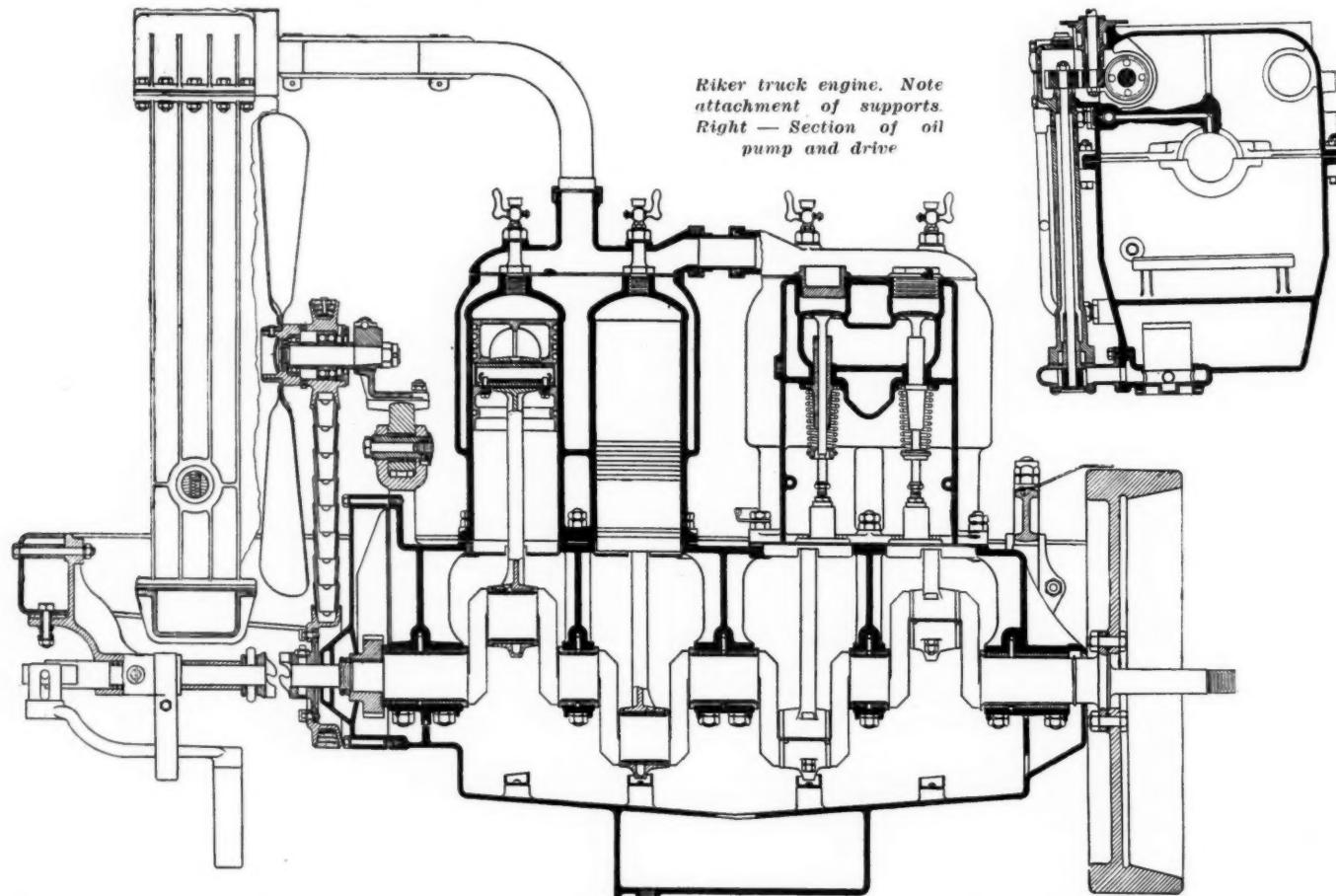
of the crankcase. A tubular extension from this casting extends downward and the lower end forms the body of the pump, the drive shaft passing up the tube centrally, and attachment to the crankcase at the bottom is made by a flange. This construction makes a single unit of the pump, its driveshaft allowing the whole to be removed as one piece.

The pump draws its supply through a strainer and delivers into the tube surrounding the shaft, up which it rises, entering the main oil channel near the top, as shown in the small inset cut on this page. From the channel leads drilled in the crankcase supply the main bearings, the dip troughs and the bearings of the water pump and magneto shaft, which latter is a separate drive on the left side of the engine. The fan pulley is also on this shaft and drives the fan by a V belt, this being a change since the date of the drawings from which the cut of the engine was made.

The carburetor, a special Ball & Ball, is mounted high, and delivers to a short manifold, ample hot air being obtained from a stove cast on the exhaust manifold and a pipe passing between the cylinder blocks. The breather pipe is also brought up between the cylinders and has the filler cap at the top in the most accessible place possible. Oil level is indicated by a high level and a low level cock on the side of the crankcase. The radiator is tubular, with aluminum header and side frames; it is mounted on trunnions and stayed to the dashboard.

Very Light Clutch

A prolongation of the crankshaft carries a very light pressed steel cone clutch, the spring and throwout thrust for which are completely inclosed. There is, of course, a short universal shaft between clutch and transmission, and the throwout collar operates through the medium of a second ball race and of the front universal. Telescopic



motion is allowed for on the slip joint included within the rear universal. In the cut on page 830 it may be noted that there is a powerful clutch brake. The universal shaft is demountable without disturbing any other part, so the clutch can be removed with little trouble.

In the transmission short shafts have not been sought especially, stiffness being given by a rigid case and substantial bearings. The latter do not seat in the case, but are all housed in steel shells, and it should be observed in the drawings that each bearing is firmly locked in position. The transmission case is hung from two points at the rear and one in front. A particularly ingenious feature is that the bearing shells are each secured to the top half of the case, which is split in a horizontal plane, so that the whole lower half can be dropped without disturbing the gears. Beyond this point, it is possible to remove any shaft from below without disturbing the top half of the case, so any work can be done on the transmission without disturbing the body.

Powerful Shaft Brake

The propeller shaft is of small diameter, of high-grade steel, and is divided, the division being made use of to accommodate a large shaft brake which is thus removed from the transmission. There are two objects in this: First, the transmission is simplified and made a more handleable unit, and, second, the brake is more easily kept cool by being well out in the open instead of blanketed behind the transmission case. A third advantage might be added, that brake stresses and heat are kept away from the gear case.

The brake is a double-shoe contracting pattern; it is mounted on a deep cross member of the frame, and the same bracket which supports it is used to suspend the front end of the pressed-steel torque arm. There is a finger adjustment for the brake, readily accessible by reaching under the body, and the shoes can be removed very easily for relining. Situated on such a deep cross member of the frame the brake is so placed that the severe torsional stresses it creates are well distributed to the side rails, the cross member being at a place where

the stress in the rails due to the load is not at a maximum, which it would be were the brake on the transmission itself.

A built-up axle case is used with cast-steel center and tubular sleeves. Perhaps its chief characteristic is the care taken in mounting the bearings, which is similar to that noted in the transmission. Worm and wheel come away with the cover in conventional worm-axle fashion, when the splined drive shafts have been removed. On the latter the use of a very large number of fine splines will be noted. Expanding shoe brakes are used, these being connected with the hand lever. Radius rods are employed, and these have spherical seatings at each end, the frame brackets which take the drive being situated close to the cross member which carries the foot brake. A point which should be observed in the axle construction is that the torque from the hand brakes does not go through the axle, as the shoe anchorage is in one piece with the adjacent spring table, which is free upon the axle.

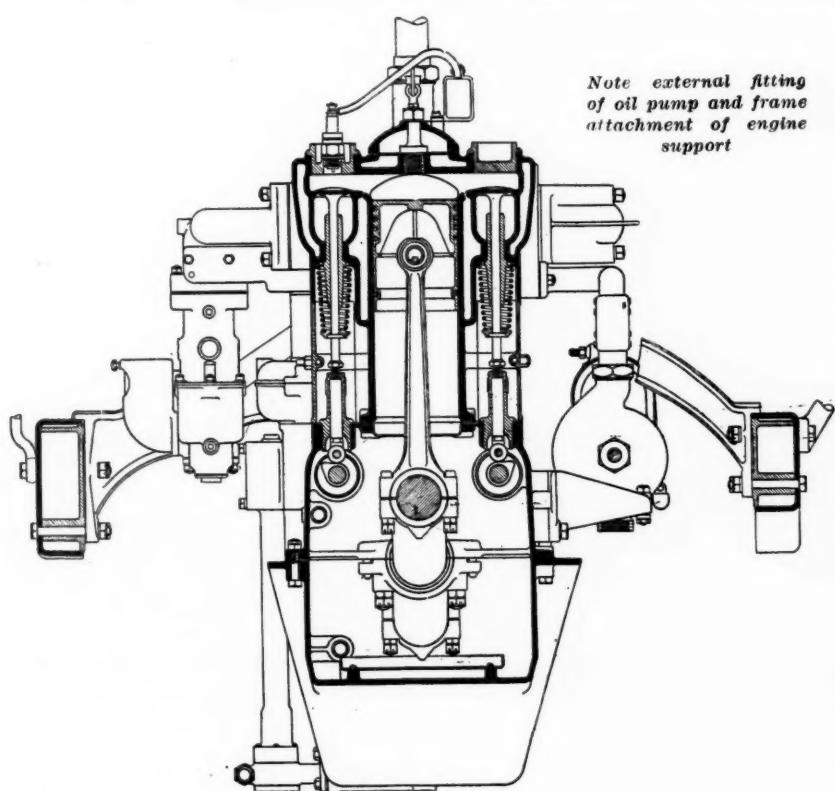
Rigid Side Rails

In the frame construction the side rails are made as rigid as possible by deep section and the use of chrome steel. They are stiffened for a part of their length by the insertion of liners which add strength to the middle portion. On the other hand, the cross members are so placed as to permit plenty of weave, care being taken in the attachment by hot riveting to guard against any loosening. The engine is hung from two forged steel arches which cross the frame, the rear one being bolted rigidly to the crankcase and the front one attached by a floating swivel pin. Owing to the arch construction this pin is brought much higher up on the engine than the usual pivot, which is nearer the crankshaft center, and this probably helps greatly in resisting torque reaction. A swivel on the crankshaft line cannot take any torsional stress, but at a higher point it is able to do so.

There is little else about the chassis that is not fully explained by the drawings on the preceding pages, except the steering-gear details. These are not unconventional, the gear itself being a worm-and-nut type, conspicuous for robustness of dimensions.

For wheels, wood is commonly supplied, but steel wheels are provided if called for. Likewise, demountable tires, dual on the rear wheels, are standard equipment. Timken roller bearings are used in all four hubs, ball bearings being employed in the transmission and for the rest of the rear axle. Throughout the chassis it is noticeable that particular care is taken to provide for thrust loads and to keep such loads off radial bearings. This is undoubtedly the best of practice, since while a radial bearing will support a fair axial load, its life is reduced considerably by compelling it to take anything except the radial load for which it is designed. Altogether, considering the housing of the transmission bearings and the methods for locking them, the Riker truck is a fine object lesson of best practice in connection with ball bearings.

Taken as a whole, it might be said that the Riker truck is conservative in its design, but it is a modern conservatism. Conservative is a word often used as a more polite equivalent for old-fashioned, and it would be entirely wrong to take it in this sense. The only old-fashioned thing about the truck is the manner of doing things the best way instead of the cheapest way.



Flint Has Automotive School

Fourteen Manufacturers Combine to Provide Specialized Instruction for Employees—School Is Well Attended—Wide Range of Subjects Covered

BY J. E. SCHIPPER

THE Flint Industrial Fellowship League has opened its school of automobile trades for the second year. The Industrial Fellowship League is an institution for the employees of the automobile and accessories factories in Flint, Mich. Every such employee is a member, and each factory has a representative on the Central Committee, known as the Executive Board. The night school is under the jurisdiction of the league and this board, and the details are carried out by committees and individuals appointed by the board. The companies which are maintaining this institution, and which are part of the Flint automobile industry, are fourteen in number. Their names and the products manufactured are given in the following list:

Armstrong Manufacturing Co., automobile springs.
 Buick Motor Co., Buick automobiles.
 Champion Ignition Co., "Cico" and "A. C." spark plugs.
 Chevrolet Motor Co., "Chevrolet" automobiles.
 Dort Motor Co., "Dort" automobiles.
 Flint Varnish & Color Works, automobile paints and varnishes.
 Imperial Wheel Co., automobile wheels.
 Mason Motor Co., automobile engines and axles.
 Marvel Carburetor Co., "Marvel" carburetors.
 Michigan Motor Castings Co., automobile castings.
 W. F. Stewart Co., automobile bodies.
 W. A. Paterson Co., "Paterson" automobiles.
 Walker-Weiss Axle Co., automobile axles.
 Weston-Mott Co., automobile axles, hubs, rims and ball bearings.

The cost of tuition in the school is placed as low as possible, and the instructors and incidental expenses are paid from the fees received. The school is held in the rooms of the Y. M. C. A., for which a nominal fee is charged, and in return the Y. M. C. A. issues a social membership card good for one year to each student upon payment of his class fees.

The courses have been largely paid out by the Automobile Technical Society, whose membership includes practically all engineers and technical men connected with the local factories. The technical society also supplies a number of the instructors, and due to the size and scope of the automobile industry in Flint it is easy to secure men with both practical and theoretical training. The instruction is made as practical as possible, in keeping with the purpose of the school to benefit the men working in the local factories, supplying them with technical knowledge and theory, which, combined with the practical experience they receive in their daily work, will make them more valuable in the trade they are following. The courses include the following subjects:

Automobile assembly and maintenance.
 Automobile starting, lighting and ignition service work.
 Automobile body painting, enameling and finishing.
 Arithmetic.
 Algebra.
 Business English.
 Beginners' English.
 Factory electrical work.
 Foundry practice.
 Geometry.
 Mechanical drawings.
 Mechanics.
 Metallurgy and heat treating.
 Penmanship.
 Tool making.

The automobile assembly and maintenance department is designed to give practical instruction on the parts and assembly of automobiles without particular attention to the theory involved, except as concerns the functions and

construction of each part and its relation to the other parts of the car. It has been found that a great many of the students who take up this work are experts in certain groups of parts, but are not familiar with the entire construction of the finished car. The course gives the student a thorough knowledge of the assembly and working of the entire car. The students study the chassis parts and their functions, engines, cooling systems, carburetors, ignition and starting systems, valves and timing, assembly, clutches, transmissions, rear axles, brakes, bearings, bodies, tops, lubrication, and operation and maintenance. The price of this course is \$15, and the equipment to carry on the practical work has been loaned by such companies as Buick, Dort and Weston-Mott. The course was laid out by W. L. Barth of the Dort Motor Co., and C. L. White, engineer of the Weston-Mott Co., is one of the instructors.

On the automobile starting, lighting and ignition service work the course has been designed to be broad enough to cover practically all makes of starting and lighting systems. The students begin with electrical theory, taking up the various analogies and symbols, after which they study batteries and electrochemistry. The student then takes up the theory of magnetism, and receives practical instruction in calculating and designing wires, conductors, resistance, condensers, measuring instruments, motors and generators. The theory and practice underlying the various makes of ignition, starting and lighting systems are taken up, together with a complete course on the troubles, tests and remedies. This course was laid out by W. E. Hodges, superintendent electrical work, Buick Motor Co., and the instructor is J. J. Hunt, in charge of starting, lighting and ignition service of the Buick Motor Co.

Special Body Lessons

The automobile-body painting, enameling and finishing courses were laid out to provide the theoretical instruction and to give all-around knowledge of practice to those who have had practical experience in only one branch of this work, or who wish to gain a broader knowledge of the trade. The student takes up the study of the metals used in automobile bodies, the preparation of metal, priming, service and rubbing coats, color of varnishes and their treatment, rubbing, striping and finishing, special processes used by various makers, and a study of enameling, baking and finishing by various methods. The cost of this course is \$12. It is laid out by G. I. Rumsey, superintendent painting and enameling and finishing department of the Buick Motor Co., and A. E. Hazel, paint superintendent of the Flint Varnish & Color Works. The instructor is Alex. Mullin, in charge of body painting for the Buick Motor Co.

The mathematical and English courses take up arithmetic, algebra, geometry, beginners' English and business English, in the same way these studies are taken up in business schools and high schools.

In the factory electrical work the complete course requires two years. The first year is for the purpose of

giving a grounding in mechanical drawing, arithmetic, geometry and algebra, and the complete course gives an insight into electricity and magnetism theories, electrodynamics, and a complete study of induction, generating and motor apparatus. The tuition fee for the first year is \$12. After two years' study a certificate is given upon an attendance of 80 per cent, with one year's credit in drawing, and the passing of an examination in mathematics and one year's practical experience.

Foundry Training

The iron foundry practice course includes the theory and requirements in pattern making, core making, molding and sand mixing. The origin, preparation and treatment of the various sands and elements used will be taken up, and the design and theory of furnaces, ores, their origin and treatment, and the melting and pouring of iron and semi-steels will be given with the practical application of foundry practice and metal combinations used in automobile practice. The tuition for this course is \$12, and the outline has been made up by J. F. Irvin of the Michigan Motor Castings Co.

Two years of mechanical drawing are given, the first year being instruction in the use of instruments and the different systems of lettering are taught. The amount of progress made by the student in this course will depend upon his ability, and he is allowed to go forward individually as far as desired. The first year's course has been laid out, and is taught by H. A. Troxel, engineering department, Buick Motor Co. The second-year course is naturally a development from the first year's

work, but the type of instruction followed is quite different. Each student is given a certain amount of work, depending on his previous experience and his ability, and works under the personal supervision of the instructor. The second-year course has no limit, as individual instruction will be given each student. The price of this course is \$10, and was laid out by J. H. Clark, engineering department, Buick Motor Co.

Shop mechanics is really applied physics. The course therein is intended for those who have had practical shop experience but who have never studied the theoretical side of the work. The study takes up the various methods of care of machines and reading of prints and drawings, besides the usual physics course, including the explanation of energy, motion and velocity, work, acceleration, heat, light, uses of various measuring devices, gages, etc., and the theory of metal cutting, drilling, boring and turning. This course was laid out by H. J. Weckler, assistant works engineer, Buick Motor Co.

Should Help Factories

Metallurgy and heat treating, practical tool making and penmanship are all one-year courses, and all have been laid out along practical lines. This set of courses, being open to the employees of the various Flint factories in the automobile industry, cannot help but develop the skill and standing of the mechanics of the community. It marks a step in the proper sort of cooperation extended to the workers of the community, and those who promoted the enterprise have been rewarded by excellent attendance during the first year, and are expecting a greatly increased body of students for this year.

Kiln-Drying Woods for Airplanes

Air-Seasoned Wood Very Scarce and Ordinary Kiln-Dried Wood Unsatisfactory

WHEN the United States entered the war the need for wood to build airplanes quickly created a difficult problem. Most of the air-seasoned wood available had been bought for airplanes for the Allied nations abroad. Thorough air-seasoning of such stock requires from one to three years, according to the size and kind of wood. Kiln-dried stock under the methods ordinarily used has frequently proved unsatisfactory, and for that reason airplane manufacturers have been reluctant to use it. If the needs of the fighting forces were to be met adequately and without prolonged delay, it was essential that methods of conditioning should be available in which full confidence could be placed.

Long before this situation developed the Forest Products Laboratory of the Forest Service, at Madison, Wis., had been making a scientific study of the drying of wood, and had developed a method of drying which has been very successful with all the woods tried. Several kilns have been built at the laboratory for experimental purposes and a number of demonstrations made in commercial kilns. Ash and spruce are the woods most in demand for airplane construction, and, anticipating the present situation, the Forest Service secured a shipment of partially air-seasoned ash and spruce plank for preliminary tests.

This material was kiln-dried without injury. Later thoroughly green Sitka spruce, white ash (northern and southern), white oak, Douglas fir, western white pine, and mahogany were secured in the log for testing. The spruce and ash logs were cut up and the green material from each species divided into three matched groups. One group of each species was tested green, another has been set aside to be tested when it has air-dried, and the third group was kiln-dried, trying several methods, and then tested. Only the results of tests on the spruce have so far been analyzed. Comparison with standard tests which had already been made shows that Sitka spruce can be kiln-dried from the green

condition with no more, perhaps less, injury to its mechanical properties than by air seasoning. Definite specifications have been prepared for kiln-drying spruce green from the saw for airplane construction, and, if rigidly enforced, they will insure kiln-dried stock of this species equal to air-dried stock.

A preliminary study of propeller construction has shown the need of such information on propeller woods. The testing of the ash and other species now on hand, which include several propeller woods, is being pushed as rapidly as possible, and there seems reason to expect as favorable results as for the spruce.



A view of the British tank in New York which gives a good idea of its dimensions

Enameling Oven Design With Relation to Safety*

Two Causes for the Explosion of Gas-Heated Ovens—The Usual Results—Lessons from Steam Boiler Safety Engineering—Improved Design of Oven Eliminates Risks

By R. A. Shaw

Safety Engineer, Ford Motor Co.

THE explosion of enameling ovens has been one of the greatest hazards in the automobile industry. I have in mind at least six large automobile plants that have had experiences with oven explosions in the past two years—and fatalities resulted in each case.

The sad part is that in most instances that have come to my attention nothing whatever has been done to prevent a repetition of such experiences. In several cases further explosions with added fatalities have been the natural result of such a course. In other cases experiments have been carried on with a view to overcoming these hazards as nearly as possible. I am glad to say that the Ford Motor Company has been among this number, and I truly feel that no little progress has been made.

Enameling oven explosions may be divided broadly into two classes: (1) the explosion of gas furnished from an outside source and used to heat the oven and (2) the explosion of gas formed inside the oven from the enamel and other internal sources as the parts to be enameled are heated.

In the first case—that of the gas used for heating the oven—several comparatively simple mechanical devices have been worked out to remove the danger of an explosion. Among these we may mention (a) the use of a thermostatic device which automatically shuts off the supply of gas from its outside source immediately if the fire is blown out, and (b) the installation of a device similar to an automobile spark-plug directly over one of the burners within the oven, so connected that if the supply of gas is temporarily cut off and later turned on it will be instantly lighted at the burner. In many cases electric ovens—that is, ovens equipped with electric heating units, have replaced the gas-heated ovens, the idea being that in using electricity as a source of heat the hazards of the gas-heating system would be eliminated. This is largely true.

But the second hazard mentioned above, that is, the explosion of gases formed inside the oven, still exists. In this case, too, the problem is not so easily solved as was the problem of handling the gas used in heating the oven. Yet there are what we may term certain precautionary measures which, if carried out, will tend greatly to reduce the possibility of an explosion from the internal source.

Must Have Open Stack

Take, for instance, the stacks. Ovens are equipped with stacks primarily for the purpose of removing smoke, vapor and various forms of residue resulting from the heating of the parts to be enameled. But there is no reason why the gases formed from this process should not, in a large measure, pass out of the stack too, provided there is an opening in the stack at all times. While circumstances surrounding many of these explosions have not been entirely clear, still it is generally believed that in a number of instances explosions would have been avoided had not the damper in the stack been entirely closed, thus giving no direct means of escape to the gases being formed. To make an outlet in the stack at all times a mechanical certainty, it is strongly recommended that an opening be provided in the damper equal to at least one-third the cross-sectional area of the stack. This

is a law, I believe, in the State of New York, and it should be in every State. With a direct means of outlet provided as suggested, the gas forming in the oven cannot be forced under pressure, and consequently the possibility of an explosion is considerably reduced.

In passing I should like to mention the fact that the Ford company is now experimenting with a steam-conveyor oven, in which a temperature of 400 deg. can be secured from steam coils placed about the walls of the oven while the parts to be enameled move slowly on a traveling conveyor. It is our intention to use this type of oven wherever possible, the idea being that there will exist a small chance either of fire or of an explosion when steam is used to provide the necessary heat instead of gas or electricity.

The construction or maintenance of the oven may be faulty or the oven-tenders may become negligent and not keep the safety equipment in proper working order. The result—an explosion. To find an ample means of outlet in case an explosion actually does take place has been the object of the Ford experiments.

The case of the steam boiler is in many ways analogous to that of the ovens. We still hear of boiler explosions, but the number is constantly decreasing. There are two principal reasons for this decrease. The first is that stringent laws have been enacted to require careful construction and inspection of boilers. The second is the use of low water alarms. Under these conditions boilers are now regarded as practically safe with reasonable care and attention.

Making Ovens Safe

To my mind there is a lesson here for us—a lesson that may be applied to the problem of making ovens safe. When there is an explosion within an enameling oven the force of the explosion is applied equally to all sides of the oven, and the result invariably has been in the past that the latch on the oven door breaks, the doors are hurled open and almost certain death awaits all who happen to be within reach.

Our idea has been that the least damage will be done if the force of the explosion is allowed to pass out of the top of the oven, and we believe that the Ford experiments have proved this point.

Even though the doors may not be very firmly locked, experience has shown us that with the top fastened down the oven is very likely to be wrecked by an explosion, for the reason that no immediate outlet is provided to neutralize the effect of the explosion. But with the doors firmly secured as ours are, and with the top loosened so that it will lift instantly when the force of the explosion is felt, the force is largely dissipated and very little real damage is done.

We tried at first to use small holes in the top of the ovens for vents, making these holes perhaps 30 in. square and providing two for each oven, with a plate laid over the opening, but it was quickly proved that these would be entirely inadequate, whereas with the entire top loosened there was no trouble experienced, the area thus opened being so large that no serious harm was done.

In conclusion I may say that I firmly believe that if enameling ovens are designed and equipped as has been outlined in this paper, fully 90 per cent of the hazards of their operation will have been overcome.

*Read at the recent New York annual Safety Congress.



The FORUM

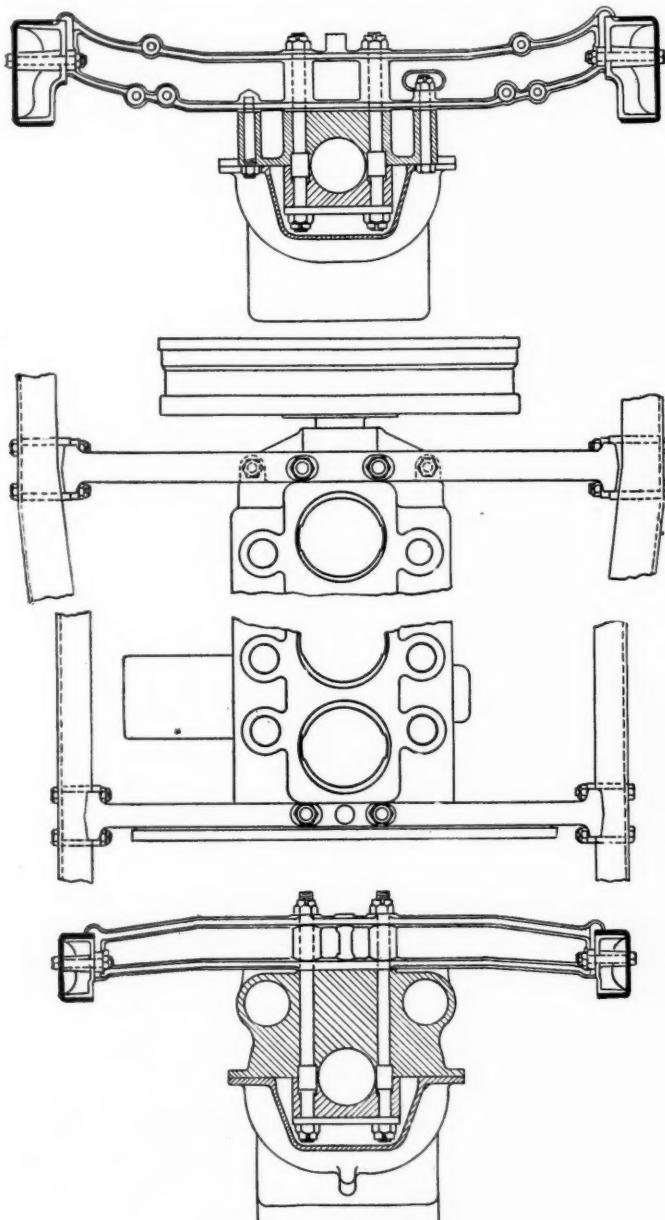


Methods of Engine Support

By D. Kess Ferguson

Chief Engineer, Pierce-Arrow Motor Car Co.

I AM inclosing a sketch showing the method of supporting the engine on the underframe of our passenger cars. We have been using this construction ever since 1906. We were induced to design this because of some trouble we had with broken feet on the aluminum engine crankcase we used in prior models, in which the engine was supported on a sub-frame. When we redesigned the chassis, doing away with the sub-frame, it, of course, necessitated much longer feet on the engine crankcase, and we felt, from our past experience with aluminum alloy, that it would be risky to rely upon that metal for this purpose. We wished to retain the aluminum alloy for the crankcase, as experience had shown this



Pierce-Arrow engine support

to be absolutely satisfactory in every other respect, and its light weight was quite a factor.

After much consideration, the design shown on the inclosed sketch was adopted and it has proven absolutely satisfactory. The engine supports are made of drop forgings of .30 to .40 carbon steel heat treated, giving an elastic limit of 70,600 lbs. per sq. in. These are made of I-beam section. The rear support is very securely bolted to the engine crankcase by four bolts, the two center bolts running through to the under side of the rear bearing cap, and having a steel plate under the cap.

Added Rigidity

In addition to these we use two outer bolts. These are not necessary to carry the weight of the engine but they serve to give greater rigidity to the flywheel end of the engine, and they materially assist the torque reaction.

The front support is bolted to the engine crankcase by the two bolts securing the front bearing cap. These bolts being very close together give a modified three-point suspension to the engine. It will be noticed that we utilize four bolts that would be required in any case, so that we obtain supports of extreme strength with very few parts. There appears to be considerable elasticity in these apparently very rigid engine supports, as we can raise one of the front wheels 8 in. from the ground without in any way binding the crankshaft in the main journals, which only have .0015 in. to .002 in. clearance in the seven journal bearings. Under these conditions the crankshaft can be freely spun by hand.

Underframe Bending

We have had cases where the underframe has been bent sideways in collision with other vehicles, where the engine supports have been bent without any injury to the aluminum crankcase. Metal filling blocks are fitted in the underframe side channels, and two bolts in each end of each engine support secure the engine in the underframe. The top flange of the supports overhangs the filling blocks and so relieves the bolts from the weight of the engine. The steel engine supports make very effective underframe cross members, admitting of using a very light front cross member whose only purpose is to carry the radiator.

We believe this construction utilizes better than any other the correct materials for the duty these parts are expected to perform.

The securing of the front engine support by means of two bolts close together gives, in some measure, the same results as a single pivoted attachment, and at the same time it has a great advantage over the pivoted joint, in that it lessens vibration, due to the angularity of the connecting-rods, by not readily permitting transverse movement of the engine except when great strain is present.

Double Ignition Advantages

By Charles E. Manierre

FOR several years past a controversy has existed between the advocates of battery ignition and magneto ignition. The strongest argument for battery ignition is that it always delivers an adequate spark at the slowest speeds, while on the other hand the magneto spark at such speed might be too weak to explode the charge, while at high speed there is a tendency for a spark so strong as to cause rapid wear at the spark plug electrodes. Incidentally, it may be said that the reason for having so small a gap at the electrodes for magneto ignition is to permit a diminished spark to bridge the gap at low speed. For the magneto it is contended, and very truly, that it is dependable,

scarcely ever out of order, that the displacement of the lines of magnetic force produces a satisfactory automatic spark advance as the speed increases, and finally that the high-tension magneto has been developed to the point where at a minimum speed it is capable of producing a satisfactory spark and at the highest speeds a spark which is not excessive.

Army Truck Has Both

The army truck specifications have found the correct solution to the question, which is that a car should have *both* systems independent and complete, including a double set of spark plugs. Aside from the extra expense the objection to this arrangement is almost nil—a few extra parts and the possibility of leakage of compression from the double set of plugs and the extra wiring, which would detract somewhat from the present clean appearance of the engine. All of this can weigh but little against the manifest and very great advantages to be obtained from two complete sources of ignition.

Ignition Trouble Frequent

Excepting only tire punctures, there is no more frequent cause of road trouble than the ignition. If it is anything more than a disconnected wire or a sooted spark plug, it presents a problem on which hours may be lost. This is true even if the operator is well informed on the subject. The car may be out of use for days, waiting the replacement of some insignificant part which has failed or worn out or the re-magnetizing of magnets. With the double system it frequently happens that a missing cylinder will take up its work

at once on switching to the other system and will run on either system after a half mile.

In this case the car is not even slowed down and the trouble is permanently disposed of. In the case of all tire troubles the difficulty is obvious and the remedy either temporary or permanent is usually within the power of the driver and he can also calculate rather closely the time which will be consumed. The exact reverse is the case with ignition trouble. The possession of a double system of ignition particularly in touring gives the driver an assurance of ability to arrive at his destination which is worth far more than the cost of the extra outfit.

Provide Magneto Platform

Battery ignition is more common on the less expensive cars and it would therefore seem reasonable to provide at least the base for a magneto and give the purchaser the option as an extra of having installed the double system. The extra spark plugs would naturally be placed in the valve caps and besides the high-tension magneto there would be needed only a shaft connection, a wire connection to the switch and a rod connection to the spark advance.

The cars of the grade in question are of four and six cylinders. They are bought in many cases by persons who could and would afford an extra \$100 if by such expenditure they could obtain the advantages above mentioned. In cars of four and six cylinders selling for above \$2,000 the double ignition it would seem should be provided for as a matter of course and at the very least should be obtainable without difficulty as an extra.

First Use of S. A. E. Standard Test

THE first official economy and acceleration test in which the equipment and method of testing recommended by the Society of Automotive Engineers has been used was made in determining the value of a combined fuel energizer and carbon remover called Moto-Pep. This test was sanctioned by the American Automobile Association, and was run under the supervision of Chester S. Ricker, technical representative of the A. A. A., on the Indianapolis Motor Speedway. This test was made on a Maxwell Oct. 17-21 inclusive, and the results have just been made public. Moto-Pep is used in the proportion of 1/5 oz. per gallon of gasoline.

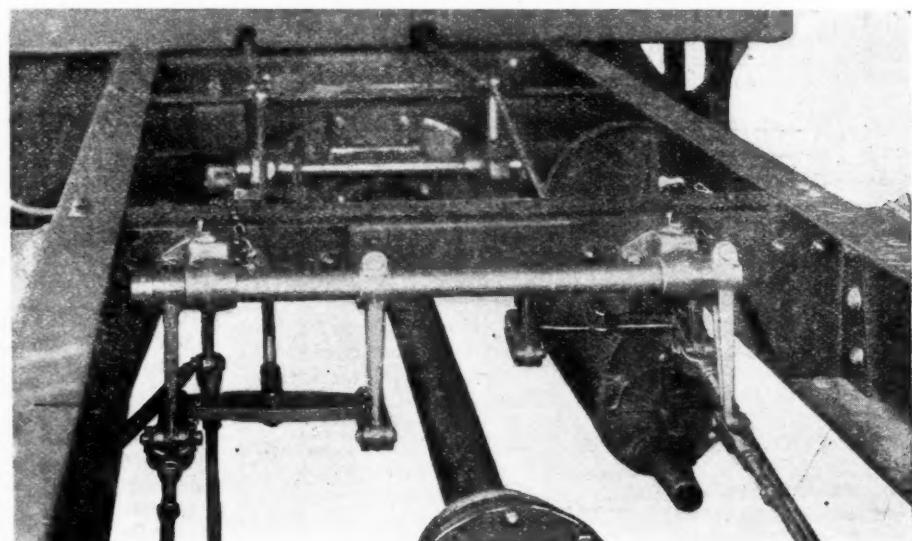
Its purpose was to compare the economy and determine the difference in operation of a standard car operated upon gasoline and then upon gasoline treated with Moto-Pep. The test was started by making acceleration and economy tests on gasoline alone. This occupied the first day, and before any more could be run the temperature dropped 50 deg., so that comparisons between results obtained on the first day and other days are not valuable. On the last day gasoline and Moto-Pep mixture and gasoline alone were used on alternate runs, so that the operating conditions were identical and a direct comparison was possible.

Shows Economy at 10 M.P.H.

It is interesting to note that when the speed was 10 m.p.h. the Moto-Pep mixture showed a gain in economy over gasoline, but at speeds both immediately above and below this figure gasoline alone showed a greater economy, being 4.8 per cent at 7 m.p.h. and 7.2 per cent at 14½ m.p.h. At all speeds above this up to 40 m.p.h. the increase in economy for the Moto-Pep mixture ranged between 10½ and 20 per cent, the greatest gain being at approximately 30 m.p.h. The best showing of economy on gasoline was 24.4 per gallon at a speed of 14.6 m.p.h. The best showing for the Moto-Pep mixture was 27 miles per gallon at 10 m.p.h. The above results were obtained on the last day of the test, when the temperature was 50 deg. Fahr.

A very much better economy showing was made for gasoline on the first day of the test, when the temperature was in the neighborhood of 80 deg. Fahr. This showed an economy of 27½ miles per gallon at all speeds from 18 to 26 m.p.h. The acceleration test was made for 2½, 10, 15 and 20 m.p.h. with both fuels, and practically no variation in acceleration was noticed with the Moto-Pep as compared with pure gasoline.

Official reports state that the car used was a Maxwell demonstrator taken from every-day service without preliminary tuning up. It had been driven nearly 2000 miles prior to the test and was considerably carboned up, as it would knock when the accelerator was suddenly depressed and the car running slow. After 200 miles, running on Moto-Pep, it was possible to depress the accelerator suddenly to the full extent with the car running at minimum speed without any pounding being evident. The report also states that it was possible to throttle down to lower speed after the run on Moto-Pep without signs of bucking; so it may be assumed that the compound reduced earlier deposit.



Brake equalizer layout on war truck

New Airplane Standards—II

Safety Belt Discussion Discloses Many Types and Conflicting Ideas—
Dope and Varnish Specifications Modified

FOUR samples of safety belts were on exhibition, viz., a Canadian belt submitted by Mr. Riddell of Toronto, a belt taken from one of the Italian airplanes recently brought to this country, a belt used by the Army and a belt used by the Navy. Captain Montgomery, Lieutenant-Colonel Goodier, Captain Ocker, Chairman Diffin of the International Airplane Standards Board and Mr. Johnson went over these samples together pointing out their good and bad features.

An objection made to the Canadian belt was that when accidentally opened it is hard to put together again. The Italian belt is made of chrome leather and has two sections of flexible webbing on the inside. The belt is put together in front by about a dozen grummets and in addition has a clasp made of heavy sheet metal. There is a flap on the end which when grasped and pulled back opens the belt in an instant. Lieutenant-Colonel Goodier thought the flap should be longer so it could be easily grasped by the mitten hand. This fastening has the advantage that it cannot be opened inadvertently. The grummets were objected to because one was never sure whether or not they had taken hold, as the click could not be heard when the engine was running. On this account a set of four clasps was considered superior to the combination of clasp and grummets.

Army Belt Simple

Of the Army belt, which is herewith illustrated, Lieutenant-Colonel Goodier said that it was simple, not apt to be accidentally opened, and if so opened it could be easily closed again. It had been extensively used and found satisfactory. In the original design the grip of the clasp extended out too far from the belt and was apt to catch, but this defect has been eliminated. An advantage of the army belt pointed out by Captain Ocker is that if the aviator is up in the air and finds he is a little too loose in his seat he can tighten up the belt by means of the buckles on it with one hand while he controls his machine with the other.

Not much was said in favor of the Navy belt, which has a clasp based on the same principle as, but of a design different from, that of the Army belt. The grip of the clasp was said to be too close to the belt to allow of a good hold being attained when the aviator wore mittens, and that it was difficult to adjust. It has to be adjusted not only for different pilots but for the same pilot according to the weight of the clothes he wears, which depends on the weather. Both Captain Ocker and Lieutenant-Colonel Goodier agreed that the belt should not be around the body, as in that case the aviator runs the risk of getting his ribs crushed in case of a fall, but that it should be across the lap.

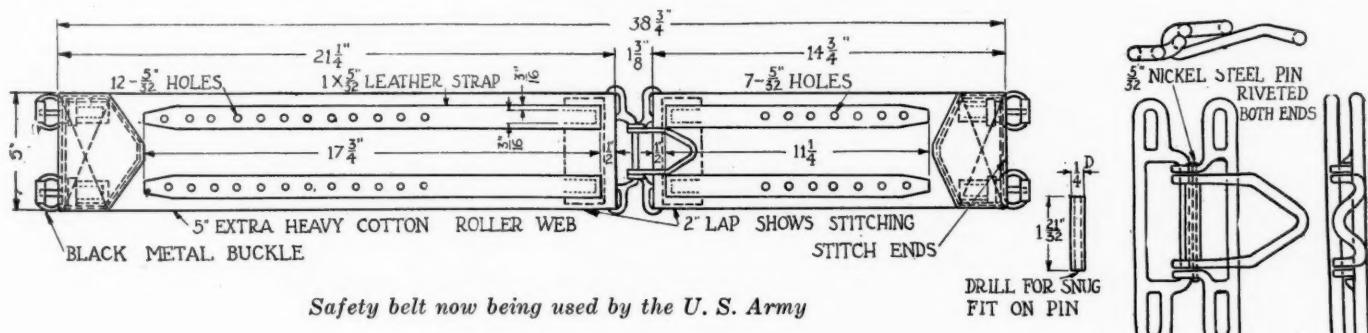
In addition to the four belts there was exhibited a separate catch, the Clarke catch. This is a special form of buckle with two pins in one piece, the pins passing through

holes punched in the belt. When the belt is closed the ends of the pins rest against a rotatable cross bar which has a lever of spring steel secured to it and has two notches cut in it, in line with the two pins respectively and deep enough so that when the cross bar is turned around till the notches face the pins the latter pull through and the belt pulls apart. Ordinarily the cross bar is held so the slots are away from the pins; by means of the friction of the end of the spring ever against the side of the catch. A little bell cord is attached to the lever, which when pulled opens the belt. An objection made to this design was that the punched holes weakened the belt.

At the meeting on Monday morning, which was called to order by Chairman Manly shortly after 10 o'clock, Mr. Smith of the Bureau of Standards reported for the Dope Sub-Committee. This sub-committee had a meeting fourteen days previously, at which the final draft of the report was approved. The report was not read in full, only the final corrections being indicated. The flying officers from the Essington, Pa., Aviation Field, Lt.-Col. Goodier and Capt. Ocker, were again in attendance and were asked to comment on the proposals in the report on the basis of their field experience. Col. Goodier said that dope must meet three requirements: It must be light enough, it must not peel off and it must stand the weather. The one thing that all aviators are afraid of is that owing to the inflammable nature of the dope the wings will catch fire. As rotary air-cooled engines are coming to be more and more used, this might be caused by an overheated engine or by a backfire. The chief object of the dope, according to the Colonel, is to reduce the skin friction.

Coating Fabric with Dope

Mr. Manly asked for any experience bearing on the recent practice of coating the fabric with dope only and eliminating the varnish coat which is intended to protect the dope from the effects of the weather. He also wanted to know whether it would not be a good plan to tear the fabric off the wings at definite intervals in order to make a thorough inspection of the wing structure, the same as an engine is overhauled every so often. Col. Goodier said that this might be a good plan if men and material were available in abundance, but under conditions as they actually exist it would be a waste of time and materials. Aside from the question of skin friction, an undoped wing cannot be used because it does not protect the interior parts of the wing from rust, which is a cause of considerable trouble at Essington. The fabric can be left on till it is rotted. It will still hold after it has so much deteriorated that one can punch a hole through it with the finger. Furthermore, quite a large hole in the fabric, large enough, say, to put one's head through, will not pre-



vent the aviator from flying his machine, according to Capt. Ocker. As to the deterioration of interior parts, as, for instance, the weakening of the spars, this can be observed by the aviator while up in the air, by the bending or bowing of wings, and it is then still time to land and make an investigation. Regarding the durability of the fabric, Capt. Ocker said this depended largely on the use the machine gets. On seaplanes, where the wings are often wetted, the fabric rots more quickly than on land machines, on which it may last for a couple of years. Another sign of weakening of the wing structure is the wrinkling of the fabric.

The report on dopes was accepted without further discussion.

Changes in Acetate Dope Specifications

Following are the changes made in the dope specifications as compared with those printed in the Oct. 4 issue of AUTOMOTIVE INDUSTRIES:

In the first paragraph it is specified that the residual film should be reasonably transparent and free from white spots. The increase in weight per sq. in. of doped fabric is now limited to 2 oz. minimum and 2.75 oz. maximum, and this test is to be made on standard fabrics. Dopes containing tetrachloretane, while not acceptable for Signal Corps repair work, will be permissible in factories with adequate ventilation. The cellulose acetate used should contain no free mineral acid and not more than 0.1 per cent of acetic acid.

In the dope test one side of the fabric mounted on a frame is to remain uppermost throughout. This test is to be made in duplicate. The test specified under this heading is to remain in effect until a mechanical test is adopted. In the sulphate test 20 grams of cellulose acetate dope are treated with 150 c. c. of water in a pressure bottle at 100 deg. for 24 hr. In the test for the amount of cellulose acetate it is specified to pour 25 grams of the dope into a Petri dish 6 in. in diameter and evaporate to dryness on the steam bath. Extract the residue with ether in a soxhlet until all extractive material has been removed. Dry at 60 deg. to constant weight and weigh.

Nitrate Dopes

Separate specifications are now printed for cellulose nitrate dopes. These in general are identical with the specifications for the acetate dope, the differences being as follows:

In the specifications for cellulose nitrate dopes, under the heading of Acidity, it is specified that the amount of free organic acidity, figured as acetic acid, may not exceed 0.05 per cent (instead of 0.2 for the cellulose acetate dope).

The paragraphs in the cellulose acetate specifications headed Sulphates, Tetrachloretane and Cellulose Acetate are replaced by a paragraph headed Cellulose Nitrate, which reads as follows: "The cellulose nitrate used in the manufacture of dope shall be purified and give a negative potassium iodide test at the end of 20 min., according to the standing method of the Bureau of Ordnance. The amount of cellulose nitrate used shall be not less than 35 grams per liter of dope."

The paragraph describing an inflammability test is omitted. In the paragraph describing a test for acidity the last portion beginning "some dopes, notably those containing much acetone," is omitted. To the portion of the paragraph which remains is added the sentence to the effect that "any satisfactory substitute method will be permissible on approval."

For the paragraphs on sulphates and amount of cellulose acetate is substituted a paragraph on amount of cellulose nitrate, which reads as follows: Pour 25 grams of the dope into 100 grams of chloroform, stirring constantly. Extract in a soxhlet with chloroform until all extracted material has been removed. Dry at 60 deg. C. to constant weight and weigh.

Mr. Walker of the Bureau of Standards made a few remarks concerning the varnish report, which had also been put in definite shape by the sub-committee, and this report was accepted without discussion. The committee is now working on enamel coatings and on color coatings and desires information as to whether the colors cannot be limited to a small number such as khaki and aluminum. Chairman Manly asked Mr. Hanks to make inquiry of the Signal Corps and to report to Mr. Walker.

In the original varnish specifications (see AUTOMOTIVE INDUSTRIES for Oct. 4) the two paragraphs beginning respectively, "A coat of varnish will be flowed" and "the varnish shall be flowed" are replaced with the following paragraph:

The varnish will be applied to a basswood panel which has been previously filled with one coat of drop black in oil thinned with turpentine and drier. It shall have suitable body to give proper brushing, flowing and covering properties. The first coat of varnish will be allowed to dry 48 hr., then lightly sandpapered, a second coat applied and allowed to dry 72 hr. The panel will then be inclined at an angle of about 40 deg. and a gentle stream of cold tap water allowed to flow down the middle of the panel for 18 hr. The varnish shall show no whitening, dulling, or other defects. A small stream of boiling water will then be allowed to flow down another portion of the panel for 20 min. The water will be siphoned through a small glass tube directly from a container in which it is boiling, onto the surface of the panel, in such a manner that there will be no appreciable lowering of the temperature of the water before it touches the varnish film. The siphon delivery tube will be in a plane nearly parallel to the plane of the panel, so that the impact of the water will not tend to break the film. The varnish shall show no appreciable whitening and no more than a very slight dulling.

The report of the sub-committee on glues was presented and accepted.

Specifications for Glue

In the material specification for glue for aeronautical use it is now explained that this specification covers all glue used for propeller construction and for splices of important structural members, such as longerons and beams, and that for all other work where woods of low shearing strength are used any glue recommended by a reputable glue manufacturer can be used.

From the paragraph headed Quality the last part, reading "or may be a sample of a glue which has been satisfactorily used in propeller construction and certified to by the authorized glue expert of the purchaser" has been omitted.

The test pieces for the strength test may be of either maple or birch (instead of only yellow birch), and must have a shearing strength of at least 2400 (instead of 2200) lb. per sq. in. of glued surface.

In the test for grease the wording "and observing the appearance" has been substituted for "and observing the grease spots."

The following has been added to the specifications: The glue which has been tested and passed shall be barreled in the presence of the Government's representative and marked with the run number, date of run and inspector's stamp. The glue which is marked in this manner may be sold as certified glue, and its use will be permitted in airplane construction.

Under the heading of Inspection and Marking the paragraph beginning "The tests at the glue factory" has been omitted.

The engine weight specifications were adopted, as was the report of the sub-committee on glues.

Heat Treatment of Welded Joints

Mr. Manly brought up the subject of heat treatment of welded joints. He thought that by suitable heat treatment the metal of the joint could be refined and rendered more tenacious. The question was whether it was better to heat the part at the joint only or to heat the whole part in an oven. There seemed to be no one present who could give information along this line, and it was therefore proposed to appoint a sub-committee to investigate the subject. Other sub-committees to be appointed will deal with tension wires, machine gun mountings, marking of spark and throttle levers, and nomenclature. Some matter on pontoon fittings had been received from the Curtiss company, and it was expected that the sub-committee on this subject will do some work inside of ten days.

The question of propeller shaft ends is still in abeyance. On the one hand the standard French propeller shaft end as used on the Hispano-Suiza engine is fairly satisfactory; the sub-committee, however, has recently learned of a shaft

end used on the Mercedes which is thought to be better, but the members have been so busy that they have had no chance to look into the matter as yet.

Mr. Ehrman reported for the Screws and Bolts Sub-committee, which has evolved a new fine thread screw standard for aircraft work, still finer than the S. A. E. standard. The coarsest pitch is 16 per inch, which is used on all diameters over $1\frac{1}{8}$ in., and the finest 40 per inch. The accompanying chart shows this standard.

The resolution relating to wheels for landing gear as adopted by the sub-committee on Saturday was put to a vote and accepted. A report by Dr. B. S. Dickinson on the tachometer shaft was submitted and approved, subject to a slight change in thread tolerances suggested by E. H. Ehrman.

The subject of rubber tubes for pipe fittings was next taken up and discussed in connection with a report by Mr. Huttle, which was accepted and approved. It was stated that tests conducted on this tube had proved it very satisfactory. It was suggested, however, that a few more sample lengths of these tubes be made and sent to the various aviation fields for use in actual flying tests.

No action was taken as to screws and bolts. On motion, a committee composed of E. H. Ehrman, chairman; C. M.

DIAMETER IN MILLIMETERS

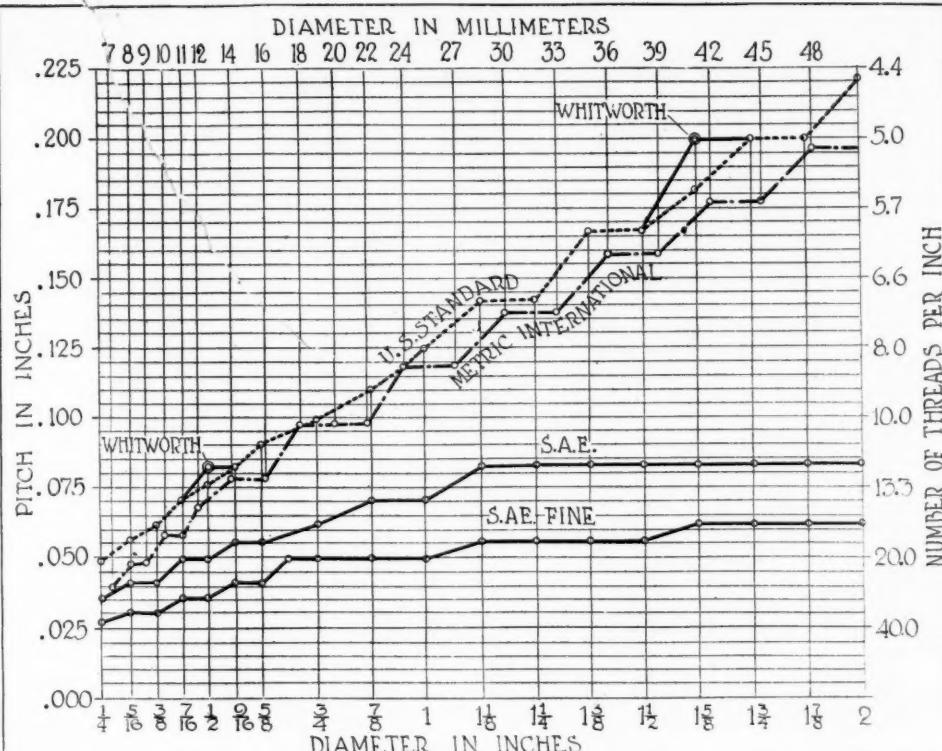


Chart comparing S. A. E. aircraft screw standard with other screw standards

Manly and F. G. Diffin was named to take up the subject of washers, and recommend action to be taken with respect to them.

Expect Huge Rubber Demand After War

THE rate of increase in the production of crude rubber for the past three years has been from two to three times the normal annual increase. However, the present rate of production cannot continue, as at present it depends on the areas planted in 1910, 1911, 1912 and part of 1913. Since 1912 the rate of planting has rapidly decreased, and it is this feature which must be considered in estimating the increase in the world's production of rubber during the next few years. It has been estimated that the plantings during the years 1913 to 1916, inclusive, are:

Year	Acreage planted	Percentage over preceding year
1913	163,091	11.2%
1914	116,696	7.2%
1915	81,246	4.7%
1916	52,000	2.8%

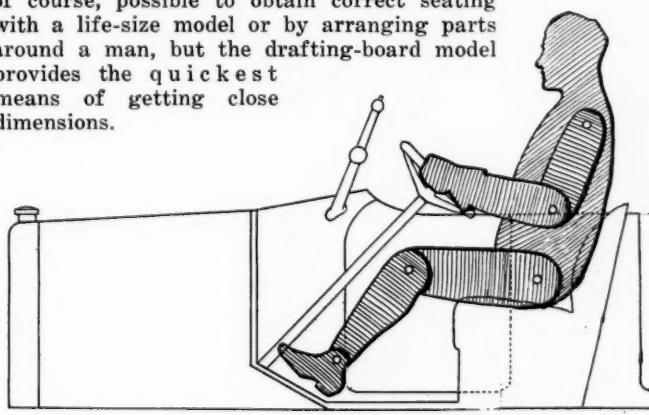
Allowances must be made for the increase of yields per tree due to growth, but there is a limit to that increase. The roads of the world eat up the greater part of the world's rubber. Motor transport was making gigantic strides before the war, and after the war will make greater strides still. If the consumption of rubber in the form of tires is great in regard to military uses, will it not be far greater than it has been in connection with commercial uses?

There are a few industries that have been more adversely affected by the war than the rubber industry. We may assume that Germany obtained direct and through neutral countries small quantities of rubber since war commenced, but her stocks and supplies are by now exhausted. The blockade has become tighter, and when Board of Trade returns for 1917 are published, I expect to find that the exports and re-exports of rubber to Sweden and Denmark will be nearer the figures of 1914 than those of 1915 and 1916. Further, Germany's old rubber goods have been reclaimed and reclaimed, until nothing but filling is left. After the war, Germany and Austria must come into the market as substantial buyers. The pre-war consumption of rubber by Germany and Austria was at least 22,000 tons per annum.

I do not say that these countries will require such a large quantity in the first post-war year, but urge that whatever our opinions may be with regard to trading with Germany after the war, Germany will require, and will obtain, large supplies of rubber soon after peace is proclaimed. So far, all the rubber produced has been sold at prices which, if not good, were at least remunerative. America takes over 60 per cent of the world's supply of rubber, and during the past two years has been importing from the East by direct lines of steamers.—Frank Copeman, in *The Americas*.

For Body Designing

THE illustration herewith shows a device used with some success in determining body proportions. The figure is cut out of five pieces of thin card and the joints are made of paper clips, the centers being chosen so as to be in accord with true anatomical proportions. With the aid of this model the effect of all sorts of changes in seating, steering wheel or control lever positions can be ascertained quickly. It is, of course, possible to obtain correct seating with a life-size model or by arranging parts around a man, but the drafting-board model provides the quickest means of getting close dimensions.



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AUTOMOBILE

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W. I. Ralph, Vice-President
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Wanted—Positive Program

WHEN the very existence of a great industry, such as the manufacture of passenger automobiles, is threatened by action such as that last week when the War Industries Board ordered the prohibition of steel shipments to the industry, it is high time that the industry impress on official Washington the necessity of at least being heard in its own defense.

It is rarely that industries are condemned in war times when the healthy fighting condition of the country depends on the activities of the industries, but it is doubly rare when the third industry of the country is threatened without being heard on its own behalf. Nothing should more forcibly impress on the industry, and on all industries, the paramount necessity of watching Washington in these days as it has never been necessary to watch Washington in peace times.

The spirit of official Washington is entirely that of good intent bent solely on winning the war, but unfortunately the apparent urgency of certain necessities frequently clouds the national perspective, and, for the time, different industries may be placed on the non-essential list whereas mature judgment

would classify them in the column of essentials.

Washington is over-worked and under-manned, and it is not surprising if misjudgments and hasty conclusions are made. It is imperative that the industries taking the longer perspective and the more national perspective, serve as the watch dogs not only for the preservation of industries, and through this preservation work for the healthy preservation of all industries, but for the country as well, and for the successful prosecution of the war.

Increase of Alloy Steel Urgent

This war cannot be won with weak industries. This war cannot be won by classifying industries as non-essentials without sufficient evidence in the case. This war cannot be won by a negative program of restriction. It must be won by a positive program of increased production.

In the case in question the positive program is to increase the production of alloy steel, rather than to follow the negative program of restricting the use of this metal in this industry. Such negative actions will never succeed.

Perhaps a parallel case is the propaganda to reduce coal consumption by restricting electric signs. This sounds economical, but as not one-tenth of 1 per cent of the coal used in the country is consumed by such signs it seems negative policy to eliminate these signs, which have such a salutary effect on the minds of our people and will have an increased effect in war days.

The more positive policy would be to increase coal production one-tenth of 1 per cent and keep the spirits of our people stimulated with the signs rather than depressed because of their absence.

Profiteering

SOME manufacturers enjoy an excellent chance for early and wide unpopularity. Observe for example your government, acting as a cautious guardian and wise banker for the Allies, obliged also to perform the duties of an alert watchman over a few of our fellow countrymen who place profits above patriotism and wealth above humanity.

The Allies borrow many millions from the United States. The money, remaining within our boundaries, is used as payment for food, ammunition, clothing for France, England, Russia and other of the allied nations in the combat against the supreme power notions of Kaiserism. Naturally, France borrowing money from the United States and spending it here feels a hesitancy and delicacy about prices.

Only Reasonable Profits Allowed

The French buyers do not enjoy the sensation of bargaining, haggling and disputing prices with the manufacturers of the nation befriending their own country. Hence, to avoid this disagreeable situation, our United States has inaugurated a system whereby American business men, intelligent, honest and above all patriotic, pass upon all purchases made by foreign countries using borrowed American money, and issue permits when prices are found reasonable. When prices are exorbitant the super-

visors call upon the manufacturers demanding proof of reasonable profits, ordering reductions when the margin is unfair.

At present a few manufacturers, inclined to demand exorbitant prices, anxious to continue raids upon the huge war expenditures, furious because civilian-military co-operation is saving our country and the Allies money, attempt to bolster prices on materials needed because of earlier purchases. These makers have ignored the demands of the supervisors and refuse to send representatives to explain profits, prices or production.

They are men, willing for the petty, insignificant businesses they conduct, to place world-wide democracy in peril, seeking to gain huge profits from the Liberty Loan money loaned to the Allies and, as we stated earlier, they are manufacturers who stand an excellent chance of speedily enjoying a mighty wide and feeling unpopularity. This is no war for conquest in which the United States is engaged. It is no war for wealth or glory. It is a necessary war for the preservation of Democracy, fought because we have to fight. And American citizens entering it, regarding it dispassionately, as a duty that must be performed, will brook no graft, no greediness, no dishonesty, as all will learn who attempt to thrive upon the lives and dollars of the people of the United States.

Extension of the Cracking Process

RECENT news items indicate that a plan is being worked out whereby the Burton process of gasoline production, which is controlled and exclusively worked by the Standard Oil interests, may be released to the independent oil companies. The Burton process is a cracking process by which the heavier hydro-carbons are cracked or converted into lighter hydro-carbons, like those composing the gasoline produced by the ordinary distillation process. In this way the yield of gasoline from a certain crude oil can be practically doubled, and the strong effect of the process on gasoline production was strikingly shown at the time of its introduction some 5 years ago. This was at the time of the first pronounced automobile fuel famine, when the retail price in the East had reached 23 cents. As a result of the introduction of the Burton process the price dropped to about two-thirds of this high level. Since that time several other cracking processes have been evolved, and one particularly, the Rittman, has received much publicity, but for one reason or another none of these seems to have become an important factor in the industry.

Although the Burton process permits of doubling the yield of gasoline, it must not be understood that the extra gasoline obtained is pure grain, for the fuel oil obtained from the crude is correspondingly reduced. However, the demand in proportion to the supply is much greater in the case of gasoline than in that of fuel oil, which is shown by the fact that the 20 per cent gasoline produced from crude by the Burton process bears 42 per cent of the expense

of working the crude, whereas the 50 per cent fuel oil bears only 27 per cent of the expense. Moreover, the demand for gasoline is increasing much faster than that for fuel oil.

It is conceivable that under the stress of war and in view of the intimate relation between an adequate fuel supply and a successful conduct of military operations the Government may take a hand in the situation. A precedent has been established in the aircraft line where the patent situation tended to interfere with large scale production. The universal use of the most efficient gasoline production process would not only be a help to the Government in carrying on the war, but would be of lasting economic benefit to the nation, as it would conserve our latent supply of fuel.

Crankcase Dilution

MOTOR truck manufacturers who are not taking heed of the crankcase dilution question are blinding their eyes to one of the most important difficulties of the day. The leakage of unburned fuel past the piston rings, leaving in its wake a dry cylinder wall and a condition of the supply of oil in the crankcase well calculated to substantially decrease the life of the crankshaft bearings, is too important a matter to be passed by with a mere statement that "We have not considered the matter."

The basic cause of the trouble is the time factor in warming up the engine. The heavier fuel products are taken care of along with the lighter when the engine has been in operation long enough to have warmed the combustion chamber and the intake passages. When the engine is cold, however, it is impossible to vaporize or to even atomize the parts of the fuel whose boiling points are well up toward 450 deg. Fahr.

There is a lesson to be drawn from an analysis of the problem, and that is the necessity for so designing the heat-applying device that the running temperature of the engine is reached quickly. No matter how well the engine may run after it is warmed up the damage done during the first 5 min. of operation cannot be repaired. The oil is cut and damaged by the inflow of the fuel and the pistons are apt to have to run on walls that are partially dry in spots, with the result that wear of the bearing surfaces is bound to be accelerated.

The question is quite closely bound up in the simple laws of heat transference. Heat will flow through a jacket wall in direct proportion to the difference in temperature between the inner and outer surfaces, in direct proportion to the conductivity of the jacket and inversely as the time required to renew the heating medium. In other words, the hotter the heating medium, the thinner the jacket wall and the quicker the hot medium is replenished after the preceding unit has deposited some of its heat, the quicker the intake will reach its working temperature. This sounds strongly like an argument in favor of the exhaust method of preheating as compared with that of the water jacket, and the tendency of the times bears this out strongly.

□ Latest News of the

3 Men Represent Industry

Chalmers, Copland and Lee to Mobilize Facilities for Prosecution of War

WASHINGTON, Nov. 7—The automobile industry will be represented by three men who will have points of contact with the Automotive Products Section of the Council of National Defense for the purpose of bringing together the needs of the Government and the capacities and facilities of the automobile industry for the prosecution of the war. John R. Lee has been named to represent the Ford company and A. W. Copland of the Detroit Gear Co. will represent the Motor and Accessory Manufacturers. Hugh Chalmers, first vice-president of the National Automobile Chamber of Commerce and also chairman of the Board of Directors of the Chalmers Motor Co., will represent the N. A. C. C.

The committee is not a part of the Government nor of the Council of National Defense, but is the official committee of the automobile industry at Washington. Among its duties will be the surveying of the plants to ascertain the idle capacity and match these up with the Government needs for the manufacturers of war necessities.

Wright Experimenting on Small Plane

DAYTON, Nov. 8—Orville Wright is now conducting extensive experiments on a low-powered airplane for practical use after the war. It is his desire to provide a plane that bears the same relation to flight as does the Ford car to travel on the ground. It is hoped to increase the efficiency of the wing surface and to provide inherent stability to such an extent that with a 100-hp. engine the machine will require but a small place for landing or starting.

Thompson to Assist Deeds

NEW YORK, Nov. 8—Colonel W. Thompson has been detailed to assist Colonel E. A. Deeds in administering the work of the Aviation Section of the Signal Corps during the absence of Colonel Sidney Waldon, who is detailed to foreign duty. Thompson has been on the Contract Committee and in charge of purchases.

Two Tax Problems Still Unsolved

WASHINGTON, Nov. 8—Much of a confusion as to the application of the War Revenue Measure in the taxation of new

and used motor cars and trucks has been cleared up. There remain only two important questions requiring more definite rulings. These are (1) whether stocks of cars held for retail sale by dealers operating under wholesale branch houses are subject to the tax; (2) whether a dealer who purchases a chassis from a factory and places a special body on it, is a producer within the meaning of the law, and, as such, is subject to the 3 per cent tax. Preliminary rulings have been given covering both these points but something more definite is looked for very shortly.

Hupp Contracts Fit Calendar Year

DETROIT, Nov. 8—Hupmobile contracts hereafter will date from January 1 instead of July 1, with the new series R cars. The interim between last July 1 and January 1 next is being cared for by six-month extensions on last year's contracts.

Jan. 10 and Feb. 1 Big S. A. E. Days

NEW YORK, Nov. 8—A comprehensive program for the Winter meeting of the Society of Automotive Engineers has been announced by the Meetings Committee. The program will center around two important S. A. E. days, one during the New York show week, the other during Chicago show week. Thursday, Jan. 10, will be S. A. E. day at the New York show. Friday, Feb. 1, will be S. A. E. day at Chicago automobile show.

The Chicago war dinner promises to be perhaps the greatest dinner ever held by the society. It will be a \$3 dinner and will come at the close of a day given over entirely to a professional session on farm tractors. The accommodation is for 1900 diners in one room. New York has been designated as the Automotive dinner and will be held at the Hotel Biltmore, Jan. 10. The dinner at the price of \$5 per plate is \$1 less than last year.

Business Conditions

DETROIT, Nov. 2—Business has been somewhat quieter here than for the past month. While this is partly the natural falling off, due to the season, it is more directly due to the many phases of the present unsettled conditions. And several of these have developed in the past 2 weeks.

In many quarters the corn and other crops are reported not to have been all that was expected, and that the market is at present slow. The weather likewise has been generally unsettled, slowing up car sales and preventing driveaways.

Gasoline Supply Is Ample

Production of Crude Oil Is Enough to Eliminate Any Fear of a Shortage

WASHINGTON, Nov. 1—The gasoline situation continues very favorably, according to latest reports from the Bureau of Mines, and the production of crude oil is such as not to warrant any fear on the part of the automobile industry for any shortage of fuel. There was a greater movement of crude oil from field sources during September than there was during August. During August there was a total movement of 21,299,089 barrels of 42 gal. per barrel, and during September this movement increased to 21,412,260 barrels. The greatest increase was in the Kansas-Oklahoma fields. There was also an increase in shipment from the gulf coast oil fields and also from the Rocky Mountain fields. The fields that showed a decrease in crude oil movement were Illinois, Texas in the north and central parts, Lima-Indiana and the Appalachian fields.

These figures represent the handling of 162 pipe lines, and in all over 162 different companies operating in the work, and thus represent the majority of all activities in the field. As such they represent the situation as it exists and are up Sept. 27, 1917.

There has been a shortage of labor for well drilling and crude production has also been slowed up for lack of casing for the wells. This casing varies from 15 to 20 in. in diameter. There is considerable activity in new pipe lines for delivering crude from the wells to the refineries. The Sinclair company is laying a new pipe line from Oklahoma to Chicago, and the Roxana company is laying a new pipe line from the Oklahoma fields to St. Louis. Movement of the tank cars by railroads has slowed up of late in about the same proportion as all freight movements have been slowed up.

The production of casing head gasoline has gone up very much in Oklahoma. The production of crude in the southeastern part of Kansas is increasing rapidly. There is still very much refinery capacity, it being estimated that refineries are not operating at more than 80 per cent of capacity.

The stock of crude petroleum in storage was cut into a little during September. This applies to the stock in all fields with the possible exception of central and north Texas, where the storage supply increased during September.

Automotive Industries □

Coffin Now Aircraft Board Head

Appointed Nov. 5 by President —Board Now Separate from Defense Council

NEW YORK, Nov. 8—It is reported that Howard E. Coffin on the fifth of this month was appointed chairman of the Aircraft Production Board by the President. The board is no longer connected with the Council of National Defense and is an entirely separate organization. All of the personnel, with the exception of one man, has been named. Those on the board will include General George O. Squier and Admiral W. D. Taylor. The board will work in conjunction with the Signal Corps

M. & A. M. Sanctions Aero Show

NEW YORK, Nov. 8—The aero show was sanctioned to-day by the Motor & Accessory Manufacturers, Inc.

The M. A. M. membership is going into the aero show—the Second International Pan-American Aeronautic Exposition, Feb. 16-23—about four times as strongly as it did a year ago.

The association has taken practically all of the second floor of Grand Central Palace, this city, and as much of the third floor as it needs.

Show Passes Require Regular Tax

NEW YORK, Nov. 8—A ruling by the Internal Revenue Department at Washington has explained what must be done in the case of tickets to motor car shows. The most interesting point is that the tax must be paid on passes.

When a pass is issued the tax paid on it is the same as that paid for regular admission. In other words if the regular admission to the show is 50 cents, which means a tax of 5 cents—1 cent for each 10—the tax on a pass would also be 10 cents.

If an exhibitor buys a large number of tickets at less than the full price and gives them away the tax on such tickets is based at 1 cent for each 10 cents which the exhibitor paid at the box office where he purchased the tickets. This tax is not based on the regular admission charge but on the actual price paid for the tickets by the exhibitor. The tax on a season ticket for an automobile show is 1 cent for each 10 cents paid for the ticket, regardless of the number of times the ticket is used.

The only persons who do not have to pay a tax on passes are: Children under

12 years of age, municipal officials on official duty and bona fide employees of the show.

A manager who will admit anyone other than those just enumerated with or without a pass or ticket violates the law if he does not pay the full tax.

Headlamp Legislation Pending

NEW YORK, Nov. 8—A meeting of the headlamp division of the S. A. E. standards committee will be held in New York, Thursday, Nov. 15, at which it is hoped some progress will be made toward the enactment of a universal headlamp law which will apply throughout the country.

September Exports Show Improvement

NEW YORK, Nov. 7—Exports of cars and trucks during the month of September showed nearly a 100 per cent improvement over the previous month. Shipments from this port totalled nearly \$6,000,000, including 1133 trucks and 2797 cars, as against \$3,000,000 in the previous month on 643 trucks and 1638 cars.

Great Britain, as in the previous month, was our biggest buyer of trucks, her purchases totalling 627 trucks valued at \$1,640,813. Russia took 145 trucks valued at \$580,897.

Passenger car shipments formed a bright light in our exports in September because they reached countries which have not been very big buyers of late. Great Britain, which has been hit by a fuel shortage with the consequent curtailment of motoring, bought sixty-three cars valued at \$245,120. Russia took 183 cars valued at \$447,690.

More Steel Prices

WASHINGTON, Nov. 5—President Wilson has approved an agreement made by the War Industries Board with the principal steel industries of the United States fixing maximum prices, subject to revision Jan. 1, 1918, on certain steel articles as follows:

	Jan. 1, 1918	Present Prices
Sheets—		
No. 28 black.....	\$5.00	\$5.50
No. 10 blue.....	4.25	5.25
No. 28 galvan....	6.25	7.50
Pipe—On $\frac{3}{4}$ -in. to		
3-in. black steel		
pipe, discount 2 and		
$2\frac{1}{4}$ per cent f.o.b.		
Pittsburgh.		
Cold Rolled Steel—17		
per cent disc. from		
March 15, 1915, list		
f.o.b. Pittsburgh.		
Wire — Plain wire,		\$3.95
\$3.25 a 100 lb.		
Tim Plates — Coke		
base, bessemer and		
open hearth, \$7.75 a		
100 lb. box, f.o.b.		\$12
	10 per cent.	

Reogle Will Direct Steel Purchases

Needs of U. S. and Allied Governments Under Raw Materials Division

WASHINGTON, D. C., Nov. 6—The War Industries Board has formed new regulations for the handling of steel purchases made both by the Government and private concerns by placing the distribution and responsibility for prompt and proper execution of all orders for iron and steel, other than ordnance, for the United States and Allied Governments, with J. L. Reogle, of the American Vanadium Co., director of Steel Products, who will operate subject to the Raw Materials Division of the War Industries Board.

Mr. Reogle will receive weekly reports from the iron and steel producers showing the tonnage of iron and steel of the various classifications on order for the United States and Allied Governments as well as domestic and foreign orders for general purposes. He will also keep informed as to mill capacities and mill production, and in cases of retarded output secure reasons therefor, and in conjunction with the manufacturers and the War Industries Board will make an effort to remove the obstacles which prevent maximum output for war necessities.

Each department of the Government will send triplicate memorandum requisitions to Mr. Reogle, who, taking in consideration of all mill conditions, maximum production and priority status of the order books of the different manufacturers, will determine as to the allocation of the orders and the necessary details, and will retain one copy, send one to the Washington office of the American Iron and Steel Institute, and return the third with the information as to where the order should be placed and the various details to the department from which the order was issued. The department will then be able to place its order directly with the manufacturer.

Requisitions from the Allied Governments after approval by the Allied Purchasing Commission will be sent to Mr. Reogle for proper distribution.

Mr. Reogle, in his instructions from the War Industries Board, has been advised to operate in close harmony with the various departments of the Government, which will give him preliminary information and aid him to secure maximum output for Government necessities at minimum cost. He will also maintain all necessary steel statistical records.

Government Not to Pay Car Tax

Makers Cannot Add It to Contract Price—Demonstrators Taxable

WASHINGTON, Nov. 5—The Internal Revenue Department of the Treasury Department, at the request of certain manufacturers and the National Automobile Chamber of Commerce, has made some additional preliminary, but not final, rulings relative to the War Revenue Act as it affects the automobile industry. Until official rulings are made the following may be taken as a guide:

1. CARS FOR THE UNITED STATES GOVERNMENT.—The Treasury Department has decided that automobiles sold by manufacturers to the United States Government on contract at contract prices cannot have the tax added to the price. It was hoped that under Section 3464 of the Revised Statutes, such automobiles could be relieved from the tax through an application from the branch of the Government purchasing the article. The Treasury Department rules that this cannot apply on present contracts.

2. PROVISION FOR ADDING TAXES TO CONTRACT PRICE.—If not already provided for in contracts, our counsel advises the addition of the following: All taxes, imposts or other charges whatsoever hereafter added or imposed by the Federal Government or any State government shall be added to the contract price.

3. FLOOR TAX.—A late ruling of the Treasury Department provides that where separate books and a separate stock are kept of cars to be sold only at retail and distinct from a line of cars which are sold both wholesale and retail, the retail stock of cars is not taxable.

4. EXAMPLE.—The Smith Automobile Company handles Hudson cars as a distributor for New York, selling at both wholesale and retail. Of all Hudson cars on hand Oct. 4, they must pay the floor tax. If the same company, however, has a separate contract with the Dodge Brothers for selling Dodge cars at retail only and there are separate contracts, separate accounts, and separate books of stock, then the Dodge cars under the retail contract are exempt from the tax. If both the Dodge and the Hudson cars are sold at wholesale as well as retail, then all the cars the wholesaler-retailer had on hand Oct. 4 are subject to the floor tax.

5. In like instance the Brown Automobile Co., a separate corporation of the factory but owned by the factory, does a wholesale and retail business in New York. It is taxed on all the cars it had in stock on Oct. 4. It does, however, have retail branches at Springfield, Bridgeport and Albany which sell cars at retail only. If the cars of those branches are held separate and accounts held separate, the retail stocks are exempt from floor tax.

6. The Walton Automobile Company of Cleveland has branches throughout the country that are not separate corporations, but do business as the Walton Automobile Company, a corporation of Ohio. Such branches, whether they do a wholesale or retail business, are selling the stock of the home manufacturer and are subject to a 3 per cent manufacturer's sales tax on the price at which sold.

7. AUTOMOBILE MANUFACTURERS SHOULD NOTIFY their wholesalers of the above rulings. In case any excess payments have been made the Internal Revenue Department has a right to refund upon application.

8. SECOND-HAND CARS.—It has been ruled definitely that second-hand cars, or used cars, are not subject to tax. Demonstrators, that is, new cars taken for demonstration purposes, are subject to tax.

9. COMPLETING AUTOMOBILE BY PLACING A BODY ON THE CHASSIS.—The Treasury Department is inclined to rule that a party who buys a chassis and then completes the automobile by the addition of a body is a "producer" within the meaning of the law, and subject to the 3 per cent tax on sale by such "producer" of the article so produced. This will apply to Form-A-Truck companies which produce an automobile from second-hand parts and certain attachments, also to a wholesaler who buys

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It is Important

chassis and has bodies made for them and attached. Under this ruling, a dealer who buys chassis and then buys bodies elsewhere for attachment is subject to a tax of 3 per cent when the articles are sold. There will be further consideration of this, because in most instances a tax will have been paid on the chassis when sold by the manufacturer; treasury officials say that in such cases a refund will be made. The same situation applies to the addition of side-car attachments to motorcycles.

10. The pressure of applications for official rulings is so great that it will be some time before they can be secured from the Treasury Department, but the above is given to show the preliminary thought of the officials, which in most cases is expected to prevail.

Motor Trucks to Carry Back Loads to Relieve Traffic

HARTFORD, CONN., Nov. 1—A plan which, it is believed, may do much to relieve the congested freight transportation conditions in Connecticut is to be tested soon by the transportation committee of the State Council of Defense.

The plan calls for the use of motor trucks in carrying back loads, or loads on return trips on which the trucks would ordinarily return empty. It also calls for a general utilization of all motor trucks which are idle part of each day or week.

There are 11,500 motor trucks in the State, and the owners have been asked by the commissioner of motor vehicles whether they are willing to co-operate.

In addition to the large war contracts already being carried by the Detroit car manufacturers, strong rumors indicate that the British Government is placing further contracts here this week. It is stated that one contract involving \$100,000,000 has already been placed, and that another for \$150,000,000 will be placed next week.

From the manufacturer to the ultimate purchaser unrest is evident, and it is impossible to predict the direction adjustment will have to take during the next 6 months. At present it looks that the decreased demand was to be automatically balanced by a decreased production, and that the manufacturers would turn their establishments over for the duration of the war to manufacture war materials. It is in the dealer organization that the greatest adjustment must take place.

National Dealers' Assn. Broadens Scope

CHICAGO, Nov. 5—Broadening the scope of the National Automobile Dealers' Assn. was the chief action taken by the directors of this organization at their formal meeting in Chicago Saturday. When the association was organized last year it was to comprise only dealers who belonged to some local dealers' organization, but Saturday's action throws the membership open to individual dealers.

Labor Problems to Be Solved

Employment and Housing May Be Taken Care of Through Government Department

WASHINGTON, Nov. 5—It is probable that a central labor-employed administration, with extensive powers, may be created for the purpose of seeing that the different industrial centers of the country are promptly and fully supplied with needed labor, while the second plan would look to the housing of labor around industrial plants.

The labor-employed administration would have sweeping powers under the selective draft act, should present plans be carried out, and it would be absolutely independent of the Department of Labor. The housing organization would see to it that undue concentration of workers in particular localities would not result, and that the problems along this line presented in the steel production centers of Pennsylvania and the manufacturing towns of New England would be solved.

The Council of National Defense has taken the position that the Government ought to go to any length to see that loss of time in delivery on vast war orders should be eliminated. To this end it is even possible that Government aid may go to the extent of making loans at a low rate of interest to workers on Government contracts, that proper housing conditions may result.

The creation of a labor-employed administration, with powers as great as those enjoyed by Food Administrator Hoover, would involve a re-drafting of regulations covering the selective draft. The President already has such power, and no further act of Congress would be necessary should he approve such a plan, once it was presented to him. This plan, it is understood, would in no way encroach upon the functions of the Department of Labor, but as the Government has now in a very special sense become an employer of labor, its interests should be looked after, advocates of the suggested plan say.

Ohio Investigating Practicality of Farm Tractor

COLUMBUS, OHIO, Nov. 3—The Ohio food administrator is conducting an investigation of the state to determine the practicality of the farm tractor. Letters have been sent to all of the crop commissioners and agricultural agents to secure accurate data on increased production resulting from tractor use.

Electric Vehicle Demand Normal

DETROIT, Nov. 3—According to a report issued by the Anderson Electric Co., the demand for electric propelled vehicles is up to normal and has been exceptionally good in the past three months. It is stated that electric cars are showing increased use in the smaller cities.

Smith Tractors to Be Continued

Smith Motor Truck Corp.
Takes Over Parts and Will Market Product

CHICAGO, Nov. 1—An arrangement has been made whereby the product of the bankrupt Smith Form-A-Tractor Co. will continue to be manufactured for the benefit of its creditors. At the time of the filing of the bankruptcy petition the company was without working capital and was unable to convert its assets into a marketable form. Since then the Smith Motor Truck Corp. has agreed to purchase the parts that are lacking and manufacture the tractor company's product.

The Smith Motor Truck Corp. will market the tractors at its own expense and will store the tractor parts until needed for the tractors, at which times it will pay cash for the parts. The receiver, Edwin D. Buell, will dispose of the machinery which the motor truck corporation will not need in carrying out this agreement, and the money so received will be available for distribution to the creditors. It is estimated that the machinery of the defunct company is worth approximately \$20,000 and the invoice value of the tractor parts is approximately \$80,000. If this price can be realized from the assets it is believed creditors will receive nearly 100 cents on the dollar. In their present condition the assets are practically worthless, but when manufactured into tractors can be disposed of at invoice price or better, those concerned reason. Hence, the agreement with Smith Motor Truck Corp., which has been appointed by the court.

This information has been sent out to the creditors of the Smith Form-A-Tractor Co. to obtain co-operation in the election of the trustee necessary to the completion of the plan.

Cole Touredan for Army Officers

INDIANAPOLIS, Nov. 4—The Cole Motor Car Co. last week obtained a Government contract to supply a large number of cars for the use of army officers. The cars are to be of the four-door Touredan type and the model was selected by the Government on account of the adaptability of the cars for the use of army officers. The cars are to be finished in olive drab with black leather upholstery, and will have special lighting and heating features. All of the cars are to have eight-cylinder motors.

Lyons Fair March 1

NEW YORK, Nov. 3—The Third Sample Fair at Lyons, France, will be held March 1, 1918. One of the most important features for this coming year will be a commercial congress to be attended by delegates from all the Allied countries as well as the neutral nations. The programme offers the following sub-

jects for discussion: 1, Improvement and regularity of maritime transportation, freight rates and the augmentation of a merchant navy; 2, organization of financial credits, commercial representation, banking systems and relations between American and French banks; 3, exchange of raw products of all kinds; 4, exchange of manufactured products.

According to the latest bulletin over 600 applications have already been received from exhibitors coming from France, England, Italy, Switzerland, United States, Spain and Holland. One thousand new booths have been ordered to take care of the expected increase over last year's record representation. Last year it was estimated that the total of the transactions amounted to about \$80,000,000, of which \$42,000,000 worth of orders were taken by Americans.

Kettering Nominated S. A. E. President

NEW YORK, Nov. 3—The nominating committee of the Society of Automotive Engineers has handed in the nominations for 1918 for the elective offices next falling vacant under the constitution, as follows:

For president, to serve 1 year, C. F. Kettering, vice-president of the Dayton Engineering Laboratories Co.

For first vice-president, to serve 1 year, David Beecroft.

For second vice-president, representing motor car engineering, to serve for 1 year, C. C. Hinkley, president and general manager of the Hinkley Motors Corp., for second vice-president, representing aviation engineering, to serve for 1 year; G. H. Houston, consulting engineer, New York.

For second vice-president, representing tractor engineering, to serve for 1 year, Fred Glover, vice-president, Emerson-Brantingham Co.

For second vice-president, representing marine engineering, to serve for 1 year, H. R. Sutphen, vice-president, Elco Co., Electro Dynamic Co. and Submarine Boat Corp.

For second vice-president, representing stationary internal-combustion engineering, to serve for 1 year, H. R. Brate, of the National Gas Engine Assn.

For members of the Council, to serve for 2 years, Charles S. Crawford, associate engineer, Premier Motor Corp.; Charles M. Manly, vice-president and chief engineer of the Curtiss Aeroplane Co.; and J. V. Whitbeck, chief engineer, Chandler Motor Car Co.

For treasurer, to serve for 1 year, Charles B. Whittelsey, vice-president and factory manager, Hartford Rubber Works Co.

Jones Enters Truck Body Field

WICHITA, KANS., Nov. 3—The Jones Motor Car Co. will enter the truck body manufacturing field. This will also include the construction of limousine, coupe, and all kinds of enclosed bodies and tops, also the manufacturing of fenders, upholstering, etc., and bodies for trucks and commercial cars.

Large War Orders Taken

\$30,000,000 Worth of Trucks Placed by Government—Airplane Engines Ordered

DETROIT, Oct. 30—Manufacturers in the automotive field have recently received many large Government contracts. The Curtiss Aeroplane & Motors Corp. has received orders for about 1500 training machines at \$4,500 each. The business will be confined solely to training machines having the O. X. type engine of 90 hp. and to the production of planes for fighting machines. It is stated that the Willys-Overland, Inc., is planning to manufacture the engines for the training machines in the plant at Toledo.

The Westinghouse Electric & Mfg. Co., of East Pittsburgh, Pa., is planning a new airplane engine plant at Swissvale, Pa., to produce 600 motors per month on a contract for 3500 machines.

The International Motor Truck Corp., New York, has received an order from the United States Government for trucks which is valued at more than \$4,000,000. The contract calls for the delivery of 500 trucks by Jan. 1, 1918, and 200 a month each in January and February. The trucks are all of the new A-C Mack model, varying from 5½ to 7½ tons.

The contract also calls for in addition to this order, one for the delivery of 200 trucks a month after the first 900 are furnished. The contract calls for a minimum purchase of 900 trucks, the maximum being determined by the time when the Government avails itself of the cancellation clause, which states that the Government may cancel further shipments on giving 60 days' notice.

Mack truck production is now at the rate of 260 a month. The company will enlarge its facilities by the installation of a large amount of new equipment so that the present production will be increased. The smaller model of Mack truck is being produced at the rate of about 100 a month.

Contracts for more than \$30,000,000 worth of war trucks have been placed by the Government and it is expected that \$10,000,000 will be expended on horse-drawn vehicles. Among these contracts are the following:

Company	Amount	Kind	Price
Packard Motor Car Co.	3,000	3-ton trucks	\$3,197
Pierce-Arrow Motor C. Co.	1,500	1½-ton trucks	3,500
Locomobile Co.	1,250	1½-ton trucks	4,071
Ford Motor Co.	2,500	Ambulances	475
General Motors Co.	1,000	1½-ton chassis	1,983
Kelly-Springfield Truck Co.	1,225	3-ton chassis	3,100

Important Changes in Stegeman Co.

MILWAUKEE, Wis., Nov. 3—Important changes in the control of the Stegeman Motor Car Co., Milwaukee, manufacturing Stegeman 6-cylinder worm-drive trucks exclusively, are about to take place, according to well defined reports. It is said that Oscar Stegeman, founder and chief engineer of the company, will retire as president and general manager to make other connections.

It has been known for some time past that Arthur Davidson, of the Harley-Davidson Motor Co., Milwaukee, has gained a large financial interest in the company and probably will divide his time between the big motorcycle manufacturing plant and the Stegeman factory. At the offices of the company it was said that a statement may be forthcoming later.

Ford and Chevrolet Lead in British Columbia Imports

VANCOUVER, B. C., Nov. 6—During the month of September 275 cars were delivered to British Columbia buyers in which Ford and Chevrolet led the list in numbers; the higher priced cars such as the Studebaker, McLaughlin and Willys-Overland coming next.

British Columbia is a fertile field for the automobile dealer and though 1400 cars have been sold since the beginning of June, the approach of winter is having but little effect upon sales. The chief difficulty is that of obtaining deliveries on cars, as the war has made it very difficult to obtain these western shipments.

An idea of another difficulty dealers have to face is the fact that a marked increase over the American price is necessary in the prices here. For example the Hupmobile selling for \$1,385 f.o.b. Detroit is \$1,750 f.o.b. Vancouver and the prices of other cars coming from the states are increased in the same ratio.

Commercial car sales have also increased greatly in the past summer and many dealers are handling trucks in addition to passenger cars. These run from the light delivery to the heavy 3- and 5-ton trucks, while truck attachment sales also find a ready market.

Six New Accessory Exhibitors

NEW YORK, Nov. 5—Six new accessory exhibitors have been added to the national shows. These are as follows:

NEW YORK

Challoner Co., Oshkosh, Wis.
Guarantee Liquid Measure Co., Pittsburgh.
Kales Stamping Co., Detroit.
Otis Elevator Co., New York.
Wire Wheel Corp. of Amer., Buffalo, N. Y.

CHICAGO

Air Device Co., Chicago.
Challoner Co., Oshkosh, Wis.
Guarantee Liquid Measure Co., Pittsburgh.
Wire Wheel Corp. of Amer., Buffalo, N. Y.

Buick Gets LeRhone and Gnome Airplane Engine Contracts

FLINT, MICH., Nov. 6—The Buick Motor Co. has received contracts from the Aircraft Production Board for the manufacture of the 80-h.p. LeRhone and the 110-h.p. Gnome airplane engines. The Westinghouse Airbrake Co. of Pittsburgh, Pa., has received similar contracts.

Shotwell Pump Increases Capital

INDIANAPOLIS, Nov. 3—The Shotwell Pump & Tank Co., Indianapolis, Ind., has increased its capital stock from \$60,000 to \$100,000.

Western Factories Want Steel

Present Situation Closely Watched—Farmers Need Cars More Than Ever

CHICAGO, Nov. 5—Automobile factories in this territory are watching very closely developments at Washington in connection with restrictions on shipments of alloy steel for passenger car manufacture. Chicago zone manufacturers and distributors are very close to the great agricultural and grain-producing area of America and realize how essential the automobile is to the farmer in these days when there is a shortage of man power on the farm aggregating 2,000,000 workers and when our army requirements call for 750,000 horses and mules in the near future. It is not believed that the War Industries Board will carry out any such action that appeared as drastic as that started a week ago.

With the exception of California and the Eastern states the sales of passenger cars throughout the country areas are up to standard, according to manufacturers in this area. With many makers November sales will be as great as those of a year ago. In the south, southeast, southwest and central west, sales are particularly good. In all of these areas dealers are not carrying such large supplies of cars as formerly, which is partly accounted for by the shorter credits given by the banks for cars on order.

De Palma's Packard Breaks 10-Mile Mark

NEW YORK, Nov. 2—Ralph De Palma broke the world's record for 10 miles for cars in the 231-300 non-competitive class at the Sheepshead Bay Speedway to-day by driving his Packard twelve racer over the line in 5 min. 17 2/5 sec., at the rate of 113.7 m.p.h. This eclipses the previous record made by Hornsted in a Benz at Brooklands track, England, on Jan. 2, 1914, in the time of 5:19.78 or 112.6 m.p.h. The world's free-for-all mark was set by Rader in a larger Packard twelve some time ago on the same track in 4:50.88 or 120.5 m.p.h. De Palma's time caught at each lap of two miles was: 1:03 3/5; 1:03 3/5; 1:04; 1:02 1/5; 1:04.

De Palma's car has a twelve-cylinder over-head valve engine with a bore of 2 21/32 and a stroke of 4 1/2 in. giving a piston displacement of 299.2 in. Wheelbase is 112, weight 2580. Goodyear cord

What About Steel?

See Page 816

It is Important

tires were used, 34 by 4 1/2 front, and 35 by 5 rear. Bethlehem spark plugs were employed.

Priority Board Gives Preference to Perishable Shipments

WASHINGTON, Nov. 3—Priority order No. 3, issued by Judge Robert S. Lovett of the Priority Board, provides commodities to and from smelting plants sufficient to keep same in operation, government shipments, live stock and perishable freight, including sugar beets, and railroad fuel supply shall first be transported by certain indicated railroad lines operating to points West and Northwest, after which cars carrying commercial coal shall have preference.

The railroads named in the order are the Denver & Rio Grande, the Los Angeles & Salt Lake Railroad Co., the Utah Railway Co., the Union Pacific Railroad Co., the Oregon Short Line Railroad Co., the Southern Pacific Co., and the Western Pacific Co.

The coal mines for which railroad service is thus provided are those in the Utah and Wyoming coal fields.

Appeal for Edsel Ford's Exemption

DETROIT, Nov. 5—The appeal from the Ford department heads for the exemption of Edsel Ford from draft obligation was forwarded this week to Washington by Adj't. Gen. Bersey. The executive heads of the Ford Motor Co. claim that Edsel Ford is largely responsible for all work being done by the Ford Motor Co. as his father is actively engaged in development of the tractor plant at Dearborn.

At present the Ford Motor Co. is carrying \$40,000,000 worth of Government contracts in addition to its regular output. It has just signed a contract for 5000 Liberty engines, which is about the same number as will be built by the Lincoln Motors and half of that to be made by Packard.

It is stated also that the Ford Motor Co. is to make all of the cylinders to these engines in its forge plant by a new process that it has developed. Formerly the cylinders were turned from a solid billet but by the new process they will be cut from steel tubing. Preparations are now being made to erect temporary buildings for the engine construction and new machinery installed through the entire plant. The Ford Motor Co. has just completed an order for 2400 ambulances and is turning out cars at the rate of 600 per month for France.

An idea of what the Ford Motor Co. is doing in its normal field may be obtained from the following figures: In September 69,982 cars and 1383 trucks were manufactured. At this time there were unfilled orders to the amount of 114,000 cars and 3547 trucks on hand. The firm Henry Ford & Son at Dearborn, Mich., is at present shipping tractors on a 6000 order for England, including extra parts for 1000 machines. The Ford Motor Co. claims that Edsel Ford's exemption is necessary to the successful fulfillment of these contracts.

Industrial Review of the Week

A Summary of Major Developments in Other Fields

Steel Situation Cleared

NEW YORK, Nov. 7—The situation has been further cleared by Government announcement on Nov. 5 of agreed prices on sheets, wrought pipe, fence wire, tin plate, cold rolled shafting and scrap. The new finished material prices as carefully worked out by the steel manufacturers committee, are in line with those previously fixed and the Government makes the important statement that on products not yet covered by official schedules the manufacturers have agreed to adjust prices promptly. Thus it appears that further Washington announcements are not to be looked for, unless at any time a general revision should be made.

Trade opinion is agreed that the new prices of this week are generally in line with the bases previously determined, with the possible exception of galvanized sheets, which at 6.25c. for No. 28 do not give a profitable spread over 5c. for black sheets, where the latter are bought in the market. In the case of scrap, the new schedule, as had been expected, establishes maximum prices at points of consumption.

It is to be noted that on wrought pipe the new prices represent \$4 a ton reduction from the last card of independent manufacturers but an advance of \$8 a ton in prices of the National Tube Co. In wire products the new basis is \$10 a ton below prices for some time made by leading independent companies and about \$6 a ton above those of the American Steel & Wire Co., at which, however, little or no commercial product could be had.

Mill Efficiency Reduced

While the price basis on which the iron and steel trade now finds itself through Government action is no bar to large production, mill efficiency is reduced both by the embargo on exports and by the way in which Government orders are given out. Frequent roll changes to meet priority requirements have been a handicap, and mill space has been held for ship steel specifications that have not come as expected. Here and there slack has resulted and commercial orders have not been ready at the moment to fill the gaps. Thus the market hears now and then that some mill is seeking prompt business at the agreed prices; then along comes more Government work. These dislocations are more or less disconcerting.

The ill-advised agitation of contract abrogation by the Federal Trade Commission has tended to restrict buying of steel for commercial uses. The trade has done no little readjusting on its own account, since the shadow of Government price fixing fell upon it over four months ago. To-day the outlook is that the present price basis will not be changed Jan. 1, but official assurance to that effect should

A New Service

Herewith AUTOMOTIVE INDUSTRIES supplies for the benefit of its readers a general summary of important developments in other fields of business. This is rendered possible by the editorial co-operation of leading industrial publications which are recognized authorities.

By compressing the general industrial situation into this form we hope to give our readers a clear and comprehensive idea of up-to-the-minute developments which they could otherwise secure only with considerable expenditure of time and effort.

come soon and it should be indicated also that no change will be made in the first half of 1918.

War steel requirements are looming up. Government shell steel now under inquiry amounts to 1,500,000 tons, of which 300,000 tons was distributed in the past week. For the destroyers recently let, 60,000 to 70,000 tons of steel has been given out, largely plates.

A measure of the scarcity of plates is found in the estimate that Government merchant ships, representing entirely new demand, will take in each of the next two years 1,500,000 tons of plates. The total production of sheared plates $\frac{1}{4}$ in. and thicker was not quite 2,500,000 tons in 1916.

Besides the 30,000 cars for Russia, held up until responsibility for payments is firmly settled, and the 10,000 cars for French railroads, builders are to supply 5000 more cars for our expeditionary forces and upward of 6000 for domestic roads are under consideration.

Inability of certain manufacturers to count on steel supply promises to figure more and more in the war toll.

The fact that various sales of coke have been made above the \$6 level has been a subject of comment in that trade. While important interests have made deliveries at \$6, since that price was fixed, there have been evasions by smaller interests to an extent that is attracting Government scrutiny.

Pig Iron Production Increased

Pig iron production increased in October to 3,303,038 tons, or 106,550 tons a day, against 3,133,954 tons in the 30 days of September, or 104,465 tons a day. More furnaces blew in and the net gain for the month was 10. The 355 stacks active Nov. 1 have an estimated capacity of 109,059 tons a day, which compares with 107,250 tons for the 345 furnaces in blast Oct. 1. The year's output of coke pig iron up to Nov. 1 was about 32,100,000 tons, or 450,000 tons less than for the first ten months of 1916.—*Iron Age*.

Coal Situation Not Normal

NEW YORK, Nov. 3—The receipts of anthracite in New England for the month of October have been disappointing. The commandeering of tonnage by the Government has somewhat decreased the available capacity of water transportation and bad weather has held up coastwise shipping for days at a time at various loading points with the result that most of the coal reaching New England territory has had to travel all-rail. The result has been that receipts have been smaller than might be desired. In New York and its environs retail yards are practically without supplies while dealers are receiving urgent requests for deliveries. Efforts are being made to relieve the situation and it is believed that increased shipments may shortly result. In most localities it is the belief that anthracite prices and coal prices in general, for that matter, have reached the lowest level they will attain during the coming winter.

Bituminous Conditions Grave

The present bituminous coal situation is the cause of grave alarm throughout the entire country. There is apparently no question but what the mines already operating and employing present labor forces could produce an abundance of coal to meet the needs of the nation. Transportation facilities however, which in past years have at various times on the individual railroads proved inadequate to meet the demand, are now proving inadequate to meet them under the press of greatly increased necessity and the advantage of the pooling arrangement. Past governmental and political railroad repression is now bearing its legitimate fruit and the nation as a whole is and will be the ultimate sufferer. It was doubtless hoped that a revision of prices upward by the Federal authorities would result in an easing of the coal stringency. Thus far, however, the increase of 45 cents per ton has been barren at least of direct results. Outside of the Pittsburgh district apparently no spot coal is to be had. Manufacturers and other industrial consumers are daily imploring the coal producers to ship them coal and offering as an incentive prices far above those fixed by the Government. Such offers cannot of course be accepted. The one-day suspension of the priority order for lake shipping went far toward temporarily relieving the stringency of fuel in the central manufacturing district of the country. It is quite possible that the close of navigation on the Great Lakes will have a similar and more permanent effect. This, however, will probably not take place for a month or 6 weeks yet, as it will probably be thought wise to make the close as late as possible.—*Coal Age*.

Hayes Co. Earns \$390,444

14 Months' Business Shows Balance of \$540,048—Unfilled Orders Total \$2,000,000

DETROIT, Nov. 2—The net earnings of the Hayes Mfg. Co. for the past 14 months were \$390,444.26 which combined with the balance or surplus amounting to \$149,604.10 carried over from the previous fiscal period, gives a balance of \$540,048.36. After deduction for dividends, including \$375,000 in stock, and two payments in cash aggregating \$89,933.40, a balance of \$73,054.96 remains in a surplus amount at the end of the year, no provision apparently having been made for the Federal income and war taxes. At present there are about \$2,000,000 worth of unfilled orders on the books of the company, and there is a prospect some work will be done for the Government. The company's working capital is about \$697,875. The directors were re-elected with the addition of Dr. James T. Upjohn, Kalamazoo, Mich., who fills a vacancy on the board.

Nelson Adds Open Cars

DETROIT, Nov. 6—Nelson cars in runabout and four seated form are now on the market, supplementing the Nelson sedan which appeared a year ago. The Nelson chassis is a highly original design of very light weight and high efficiency produced by E. A. Nelson who has been at work upon it ever since he left the Hupmobile Co. several years ago. The appearance is as original as the design.

The new open bodies follow the general lines of the sedan, the absence of conventional cowl being a feature. The hood is very high and the body sides low with extremely low seating. Prices are four passenger \$1,400, runabout \$1,200 and sedan \$1,800.

Mason Tire Adds to Line

KENT, OHIO, Nov. 6—The Mason Tire & Rubber Co. will greatly add to its line. A cord tire with the letter M used as a non-skid design will be ready for 1918 delivery. A full line of rubber accessories will be made. The only change in the present line will be the redesign of the Lattice non-skid and ribbed tread models so that the high crown is eliminated and better wearing qualities thus secured.

Dunham Body Reorganizes

NEWARK, N. J., Nov. 5—The Dunham Body Co. has been organized to succeed D. B. Dunham & Son, builders of automobile bodies. The officers of the new company are: President, Frederic W. Dunham; secretary and sales manager, Lindsay Dunham; treasurer, Charles W. Oathout.

In keeping with the reorganization of the company, radical changes are also being made at the plant, located at Avenue B and Miller Street. A new building is at present being constructed.

Aluminum Castings Places Contracts

DETROIT, Nov. 5—The Aluminum Castings Co. has placed contracts for a brick, steel and frame addition to its factory at Dunn Road and Chene Street, and for the erection of a girls' rest room and locker room.

Big Drop in Prices of Securities

Government Reports and Liquidation Have Depressing Effect on Issues

NEW YORK, Nov. 7—Declines of from a fraction to 14 points occurred last week in the automotive and allied securities. Pressure on the motor issues is the result of the Priority Board's ruling designating passenger cars as non-essentials. There has also been much liquidation and this and other depressing factors tended to bring stocks down to new lows.

Maxwell common last Saturday broke to 19½, showing a loss of 8½ points from the previous day's close. The second preferred sold 13, off 1½ points, and the first preferred 56, off 2 points. Maxwell common on Monday was quoted at 21, just 10 points off from the previous Monday's mark. The first preferred was 9 points lower.

Chandler, Chevrolet, Curtiss, Fisher Body, Miller Rubber, Goodyear, Stewart-Warner and Willys-Overland were particularly weak last week, and as a result showed net losses of from 7 to 14 points.

Packard and Hupp have been the strongest of the automobile stocks. Hupp, though low, has been holding up strong during the present pressure. Packard has seen a steady rise during the past 3 weeks.

Higrade Motors for Harbor Springs

HARBOR SPRINGS, MICH., Nov. 5—The Higrade Motors Co. will doubtless locate in this city and will start production at

Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge	Bid	Asked	Net Ch'ge	
*Ajax Rubber Co.	50	51	-7	Springfield Body Corp. pfd.	8	9	..
*J. I. Case T. M. Co. pfd.	..	82	-1	Standard Motor Construction Co.	49	50	-9
Chalmers Motor Co. com.	2	4	-1	*Stewart-Warner Speed. Corp.	35 3/4	35 1/2	-1 1/2
Chalmers Motor Co. pfd.	..	..	..	*Studebaker Corp. com.	84	86	-5
*Chandler Motor Co.	57 1/2	60	-12 1/2	Submarine Boat	13 1/2	11	..
Chevrolet Motor Co.	60	63	-10	Swinehart Tire & Rubber Co.	..	40	..
Curtiss Aeroplane	27	24	-4	United Motors Corp.	17 1/2	17 1/2	-1 1/2
*Fisher Body Corp. com.	23	30	-7	U. S. Aero Corp.	4	4	..
*Fisher Body Corp. pfd.	70	73	-18	*U. S. Rubber Co. com.	52	52 1/2	-5
Fisk Rubber Co. com.	50	60	..	*U. S. Rubber Co. pfd.	96	99	-3
Fisk Rubber Co. 1st pf.	100	105	..	*White Motor Co.	34 3/4	34 1/2	-3 1/2
Fisk Rubber Co. 2nd pf.	85	95	..	*Willys-Overland Co. com.	17 1/2	18	-1 1/2
Firestone Tire & Rubber Co. com.	98	101	+1	*Willys-Overland Co. pfd.	74	75	-14
Firestone Tire & Rubber Co. pfd.	98	101	..	Wright-Martin	7 1/4	6 1/2	-1 1/4
*General Motors Co. com.	85 1/2	85 3/4	-1 1/2	*At close November 5, 1917. Listed New York Stock Exchange.			
*General Motors Co. pfd.	73 3/4	75	-1 1/4				
*B. F. Goodrich Co. com.	35 1/2	36 1/2	-4				
*B. F. Goodrich Co. pfd.	98 3/4	99	-1/4				
Goodyear Tire & Rubber Co. com.	145	150	-14				
Goodyear Tire & Rubber Co. pfd.	98	100	-1				
Grant Motor Car Corp.	2	4	..				
Hupp Motor Car Corp. com.	2 1/2	2 1/2	-1/8				
Hupp Motor Car Corp. pfd.	82	88	..				
International Motor Co. com.	8	11	-1				
International Motor Co. 1st pf.	..	50	..				
International Motor Co. 2nd pf.	15	30	..				
*Kelly-Springfield Tire Co. com.	38 1/4	40	-5 3/4				
*Kelly-Springfield Tire Co. 1st pf.	80	85	-5				
*Lee Rubber & Tire Corp.	14	14 1/4	-1				
*Maxwell Motor Co., Inc. com.	21	22	-10				
*Maxwell Motor Co., Inc. 1st pf.	54	56	-9				
*Maxwell Motor Co., Inc. 2nd pf.	13 1/2	14	-5 1/2				
Miller Rubber Co. com.	120	125	-14				
Miller Rubber Co. pfd.	98	101	..				
Packard Motor Car Co. com.	120	130	+8				
Packard Motor Car Co. pfd.	94	97	..				
Paige-Detroit Motor Car Co.	19	21	-1				
Peerless Truck & Motor Corp.	9	11	-1				
Portage Rubber Co. com.	115	120	-3				
Regal Motor Car Co. pfd.	10	20	..				
Reo Motor Car Co.	19	20	-3				
*Saxon Motor Car Corp.	..	6 1/4	..				
Springfield Body Corp. com.	..	..	..	
OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE							
ACTIVE STOCKS							
	Bid	Asked	Net Ch'ge	Bid	Asked	Net Ch'ge	
Auto Body Co.	..	10	..	..	28 1/2	..	
Bower Roller Bearing Co.	..	66	72	-6	..	..
Chevrolet Motor Co.	..	7	..	..	..	..
Commerce Motor Car Co.	..	5	5 1/2	-3 1/2	..	..
Continental Motor Co. com.	..	..	..	..	..	..
Continental Motor Co. pfd.	..	..	..	..	..	..
Edmunds & Jones com.	..	..	..	..	..	..
Ford Motor Co. of Canada	168	173	-32	..	..	..
Hall Lamp Co.	..	19	..	..	..	..
Michigan Stamping Co. com.	..	12 3/4	..	..	..	..
Motor Products	..	128	..	..	..	..
Packard Motor Car Co. com.	..	..	..	..	..	..
Packard Motor Car Co. pfd.	..	..	..	..	..	..
Paige-Detroit Motor Car Co.	..	18 1/2	20 1/4	..	..	..
Prudden Wheel Co.	..	14	15	-6	..	..
Reo Motor Car Co.	..	19 1/2	19 1/2	-2 1/2	..	..
INACTIVE STOCKS							
Atlas Drop Forge	..	..	..	..	35 1/2	..	
Kelsey Wheel Co.	..	80	88	+2	..	..
Regal Motor Car Co.	..	..	..	..	26 1/2	..	

once in the machine shop of E. Shay & Son, which has been rented for that purpose. At present material is on hand for the first twenty-five trucks. At a recent meeting of business men more than \$10,000 worth of stock was subscribed to the company in addition to the \$15,000 previously sold here. This provides a working capital of approximately \$75,000.

Decimal Units for Jobbing Trade

CHICAGO, Nov. 6—Packing goods in units of ten instead of dozens is one of the results of the standardization work taken up by the National Association of Automobile Accessory Jobbers. Not all manufacturers can change over at once, but a number will have ten-unit goods for the coming season, others will change as new cartons are ordered and some who cannot pack in ten units will bill on a ten basis. One of the great advantages of the new method is convenience in figuring prices.

Three 1918 Allen Models

FOSTORIA, OHIO, Nov. 6—The Allen line for 1918 will consist of three models—a four- and five-passenger touring at \$1,095 and a five-passenger sedan at \$1,395. The engine, which is Allen's own make, has a bore of $3\frac{3}{4}$ in. and a stroke of 5 in.

Cylinders are L-head and lubrication is splash circulation. The carburetor is a Stromberg taking fuel from a vacuum tank and the electrical system is a two-unit Westinghouse. A Borg & Beck single plate dry disk clutch together with the gearbox is in a unit with the engine. Drive is Hotchkiss, there being a hollow propeller shaft with two universals that transmits power through spiral bevel gears to the floating rear axle.

One side of the engine carries practically all of the accessories. For example, the plugs, valve adjustment, oil pump, oil filler, priming cups, etc., are all on the carburetor side of the engine. The vacuum feed is Stewart which takes fuel from a 13-gal. tank in the rear.

The new Allen bodies are roomy, low hung and well finished. The upholstery covers double-deck springs which make for easy riding. The rear seat is 49 in. wide, which gives room for three large passengers in the rear.

Neatly arranged on the dash is the carburetor choke, speedometer, ammeter, Connecticut automatic ignition circuit breaker and dash light. All electric controls for starting, lighting and ignition and the Garford motor-driven horn are in unit in the Connecticut rotary switch.

Chicago Accessory Makers Issue Publication

NEW YORK, Nov. 5—The Chicago Automobile Accessory Manufacturers have issued a "prospectus," handsomely gotten up, which contains a brief history of the city of Chicago, a list of members, a map of Chicago showing the location of members' plants and a number of photographic reproductions of meetings.

October 30 a Record Day for Packard

Over \$1,000,000 in Orders Received—30 Per Cent Increase in Sales from Contest

DETROIT, Nov. 5—The Packard Motor Car Co. reports Tuesday, Oct. 30, as marking the largest number of orders received in the history of the company. On that day orders on Twin-Six cars valued at over \$1,000,000 were received by mail and telegram from all parts of the country.

The business on this day marked the climax of a 6 weeks' sales contest and reports to date show good business conditions over the country, especially in the west. As compared with the corresponding 6 weeks in 1916, an increase of more than 30 per cent is shown. Detroit showed an increase of 225 per cent; Cleveland, 175 per cent; Baltimore, 170 per cent; Denver, 165 per cent; Omaha, 117 per cent; Syracuse, 108 per cent; Davenport, 14 per cent; Fairmont, 125 per cent; Helena, 200 per cent; Flint, 233 per cent; El Paso, 100 per cent; Sioux Falls, 133 per cent; Charlestown, W. Va., 166 per cent.

Among the points contributing to the big volume of business reported on Oct. 29 were Detroit sending in fifty-six orders and Cleveland fifty.

Fulton Announces 3000-Lb. Model

NEW YORK, Nov. 3—A new model of its 3000-lb. motor truck, to be known as model F-X, has just been announced by the Fulton Motor Truck Co. of Farmingdale, L. I., N. Y. The new truck lists at \$1,420 f. o. b. Farmingdale. The engine is a four-cylinder one of block type, $3\frac{3}{4}$ by 5 in., the cylinders being of L-head type. The new motor is larger than the old one and is not interchangeable with it. No governor is fitted. The Carter carburetor is used, having been found to give the best results as to economy and power with this engine. The choke is now operated from the steering column, which is more convenient than the former arrangement.

A foot accelerator is located on the floor board. It facilitates gear shifting and makes the truck easier to operate in traffic. The Dixie high tension magneto continues to be used, but a spark timer is now fitted. The leaves of the rear springs are heavier and have been increased in number so as to increase the factor of safety. Two heavy leaves are wrapped around the bearings of the front shackles in accordance with U. S. A. truck specifications for the Hotchkiss drive. The Borg & Beck three plate clutch is now used.

A new and heavier type axle, the Russell internal gear drive, is now being used. Twelve chrome nickel heat-treated steel bolts hold the driven gears more securely than formerly. The front axle also has been made heavier and has a longer steering arm than model F-1, so as to give greater steering leverage

and allow of a shorter turning radius. Adjustable screw stops are located on the axle. The steering column carries double control levers and the wheel is lower than formerly.

The bearing for the starting crank is now carried by an extension of the front end of the motor, instead of at the bottom of the radiator tank. The brake rods are at the inside of the frame, where they are protected against accidental bending as well as against clogging with mud thrown off the rear wheel. Heavy hood fasteners with springs have replaced the old screw clamps. The hood is fitted with anti-squeak fabric and is also of more attractive form. The radiator is now supported on the lower flanges of the frame side rail. Vim leather disks are used for cushions between the radiator and support. Oil cups have been replaced by good sized grease cups throughout. Lamp brackets are secured to the dash board, which makes the lamps more effective. Heavier stock is used in the fenders. Running boards and floor boards are fastened with T-head bolts instead of plain screws, to prevent splitting of the boards. Either castellated nuts and cotter pins or jam nuts are used on all bolts. The fan belt is of the endless fabric non-breakable type, which eliminates trouble with fasteners. The tire equipment consists of 34 by $3\frac{1}{2}$ in. front and 34 by 5 in. rear tires.

Kansas Oil Output to Be Enlarged

TOPEKA, KAN., Nov. 2—A decision of importance to the automotive industry has been handed down by the State Supreme Court, which permits the Standard Oil companies of Kansas and Indiana to engage in the production of oil in this state. The decree permits the companies to become producers as well as refiners and distributors. There are thirty-one refineries in Kansas with a daily output of 75,575 barrels of crude petroleum.

The Standard company has been for 8 years under the guardianship of the Kansas Supreme Court and was prohibited from producing any oil on its own account. It could buy crude only from the Prairie Oil & Gas Co., which could only produce and transport oil. It could do no refining and could sell oil only to the Indiana and Kansas Standard Oil companies.

Kansas has over 6,000,000 barrels of crude petroleum stored in tanks waiting for a pipe line or sufficient tank cars to haul this oil to a refinery, according to the state geological officials. Some of this oil has been in storage since the fall of 1915. The owners of this stored oil are willing and anxious to sell and would have sold months ago if they could.

Harrow Plant in St. Clair

ST. CLAIR, MICH., Nov. 6—The A. T. Harrow Tractor Co. will build a plant here in which tractors will be produced. The first units of the new plant will be used for assembly purposes only in order to speed production. The plant will be enlarged by degrees and later the Harrow company will make its own parts.

Change Motorcycle Standards

Permanent Committee of Engineers Formed — W. S. Harley Is Chairman

CHICAGO, Nov. 3—A meeting of the Military Motor Cycle Standardization Division of the S. A. E. Standards Committee was held here at the Congress Hotel, Oct. 30. A permanent committee has now been formed of motorcycle engineers who are members of the Society of Automotive Engineers, and this committee took over the standardization work which has been carried on by a temporary committee under the auspices of the Standardization Committee. William S. Harley of the Harley-Davidson Motorcycle Co. is chairman of the new committee, and T. C. Butler, Jr., of the Hendee Mfg. Co. acted as secretary.

The first work of the meeting consisted of deciding upon a number of dimensions of the standard motorcycle spoke. These having been agreed upon, the standardization of motorcycle wheels, with the exception of hubs, has now been completed. The committee has gone into considerable detail in this work, having even specified tests for the wire for spokes, as well as the chemical composition of the steel from which the wire is to be made. Further, all dimensions of the spokes and nipples have been fixed, and limits set for the more important machined parts. The tolerances for the rim will be obtained from the Clincher Automobile Tire Association, and entered upon the records.

The next thing to be taken up by the committee is the standardization of the hubs. No particular difficulties are anticipated in standardizing front hubs, and it is believed to be quite possible to make these interchangeable with side car hubs. On the other hand, considerable difficulty will be involved in the standardization of the driving wheel hubs, and one or two motorcycle manufacturers will have to completely redesign their drive from the engine back if this standardization is to be carried out.

It was decided among the members of the committee representing motorcycle manufacturers to exchange blueprints of their hubs and see what can be done in the way of standardization, so that this subject can be taken up at the next meeting, which it was decided to hold at the Wisconsin Hotel, Milwaukee, Wis., on December 3 at 9.30 a. m.

Following is a list of those present at the meeting:

Wm. S. Harley, Harley-Davidson Motorcycle Co., Milwaukee, Wis.

C. O. Hedstrom, Hendee Mfg. Co., Springfield, Mass.

G. W. Money, National Screw and Tack Co., Cleveland, Ohio.

R. F. Rogers, Rogers Mfg. Co., Chicago, Ill.
Frank B. Rodger, Harley-Davidson Motorcycle Co., Milwaukee, Wis.

George T. Briggs, Wheeler & Schebler Co., Indianapolis, Ind.

Major F. C. Hecox, Quartermaster's Corps, Gettysburg, Pa.

T. C. Butler, Jr., Hendee Mfg. Co., Springfield, Mass.

Frank W. Schwimm, Excelsior Motor Mfg. and Supply Co., Chicago, Ill.

T. J. Sullivan, Motorcycling and Bicycling, Chicago.

P. M. Heldt, Class Journal Co., New York.
G. A. Krauss, Champion Spark Plug Mfg. Co., Toledo, Ohio.

Relation of Spark Plug to Airplane Discussed

FLINT, MICH., Nov. 7—At the meeting of the Automobile Technical Society to be held to-night Geo. de Guichard of the Champion Ignition Co. will talk on the subject of the spark plug and its relation to the development of high speed airplane engines. His talk will be followed by moving pictures showing the manufacture of the plug at the Champion plant.

Touring Sedan for Hackett

JACKSON, MICH., Nov. 6—The Hackett Motor Car Co. will announce a touring sedan and a three-passenger coupe in the near future. It is expected that the plant will be moved to Grand Rapids early in the spring.

Spruce Production Delayed By Pro-German Influence

WASHINGTON, Nov. 6—The use of spruce in the airplane industry is each day becoming larger. The Northwest woods have supplied most of this wood, much of which is being used in the propellers. The grade from this section is clear-cut and straight-grained and this is the only section where this grade can be obtained. Though shipments of spruce from the Northwest have been coming through favorably, the production has been somewhat delayed by strikes and other influences.

These influences, it is believed, may cause a drastic campaign against agitators in this part of the country, who are believed to belong to a pro-German agency, and who are at work to hinder the aircraft production program. Numerous cases of sabotage have been reported from the mills. The menace reported takes the form of accidents to mill machinery, fires in important lumber yards, boiler explosions, etc., that might be due to chance or carelessness. The regularity with which they have occurred, however, has aroused the suspicion of the officials.

All But One of Sparks-Withington Directors in War Service

JACKSON, MICH., Nov. 5—Every member of the board of directors of the Sparks-Withington Co., with the exception of Mr. Sparks himself, is in the Government service. Captain Phillip Withington, president of the company, is in France; Captain Winthrop Withington, vice-president, is at Camp Meade; Major Otto Filler, director, is with the Ohio National Guard, and Captain David Johnson, secretary, is with the War Department at Washington.

To Discuss Factory Organization

"Planning and Mechanical Efficiency" Subject of Nov. 16 Meeting

DETROIT, Nov. 3—Friday, Nov. 16, in the Convention Hall of the Hotel Pontchartrain, there will be held the third meeting of the Detroit Section, Society of Automotive Engineers, to discuss a paper under the title of "Planning and Mechanical Efficiency," by Geo. C. McMullen, Timken-Detroit Axle Co.; C. A. Marston, Hupmobile Motor Car Co., and C. W. Avery, Ford Motor Co.

The paper touches on the phases of organization subdivided in management—such as purchasing, production, inspection and shipment of the finished product; and will deal at length on such points as purchasing methods, and planning of the material with reference to financial budgets, machine tool selection, floor plan arrangements, and progressive manufacturing; proper points in control of inspection; besides discussion on painting, oven drying, spraying and coating. The authors make the following points:

"With the design given, the total output determined, the next step for the car or truck manufacturer is the scheduling of the material required for a given monthly production, the release of this schedule to the purchasing department specifying deliveries, and the necessary 'follow up' required to deliver to the factory organization the material to produce their quota of cars per day. This without machine delays or an unbalanced stock condition."

"Again the factory must be so equipped and organized to manufacture parts, assembly units, etc., with the least possible operations. This requires the proper grouping of machines and the use of special equipment to avoid unnecessary handling of materials. It requires progressive assembling with convenient stock location, etc."

"The paper will discuss these various problems and will describe with the help of moving pictures and lantern slides some of the various methods now in successful operation."

Intercity Parcel Post Plan Abandoned

WASHINGTON, Nov. 3—The proposed establishment of a motor truck parcel post service between Washington and Richmond, Va., has been abandoned. A survey as to the condition of the roads between the two cities has just been completed by Assistant Superintendent Ryan of the division of rural mails, over the route, primarily to determine the condition of the roads which, in their present condition, he finds to be impracticable for use of heavy trucks, although it is entirely feasible for them to be put in perfect condition.

Conditions have been investigated in Savannah, Ga., for a motor parcel post service between that city and Statesboro.

Youngstown Steel Co.**Capitalized for \$1,000,000**

YOUNGSTOWN, OHIO, Nov. 3—The Youngstown Pressed Steel Co. has been organized with a capital of \$1,000,000 and has purchased the fabricating departments of the Sharon Steel Hoop Co. and its subsidiary, the Youngstown Iron & Steel Co. For the present these departments will be operated in their present quarters but later a new plant will be built with increased capacity. The Sharon Steel Hoop Co. is expecting to extend its sheet and plate metal departments. W. W. Galbreath heads the new company and G. F. Danielson is associated with him. The capitalization of the new corporation is all paid in.

PORLTAND, ME., Nov. 6—The United States Auto Gear-Shift Co. has been formed and capitalized at \$1,500,000. C. G. Trott is president and P. B. Drew, treasurer.

New Companies Formed

Latest additions to ranks of Automotive Industries

NEW YORK, Nov. 7—The Taylor Motor Truck Co. has been incorporated with a capital of \$10,000 to manufacture motor trucks. C. K. Christy, W. J. Heffernan and E. F. Twyman, Jr., Fifty-fifth Street and Broadway, are the incorporators.

ANDERSON, IND., Nov. 7—The Lincoln Motor Truck Co. has been formed to build trucks and has taken over part of the plant of the Spring Steel Fence Co. The directors are R. J. Walker, M. G. O'Brien and Ernest Bartsch, Detroit.

Kant-Miss Co. Formed To Make Spark Plugs

GREEN BAY, WIS., Nov. 3—The Kant-Miss Spark Plug Co., Green Bay, has been organized with a capital stock of \$10,000 to manufacture spark plugs and other gas engine and automobile supplies, devices and accessories. The owners of the new company are William C. Haslem, Bearl E. Calburn and Jack Gilleaume.

TOLEDO, Nov. 6—The Lewis Foundry Co. is re-incorporated as the Lewis Steel Products Co., and has increased its capitalization to \$100,000. This company manufactures from 10,000 to 15,000 gas and gasoline engine valves per day and employs nearly 200 men in the factory and machine shop. These vary from the type used in the motorcycle engine to those used in automobiles, airplanes and tractors. Two new buildings have recently been added, but these are not sufficient to handle the increased business.

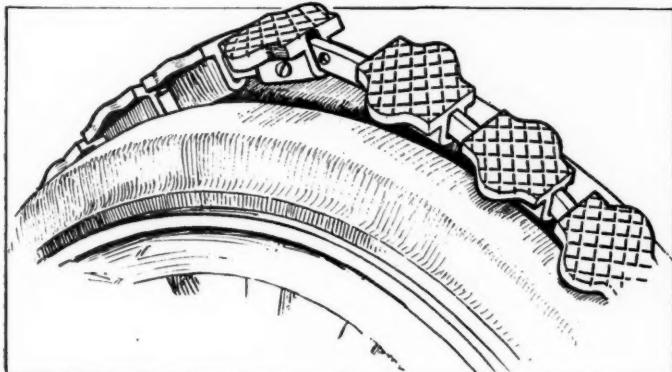
Brook Non-Skid for Twin-Tired Trucks

A RATHER novel non-skid for truck wheels fitted with twin tires has been brought out in England and is illustrated herewith. It is known as the Brook, and the London and export agency is held by Brown Bros., Ltd., 22-34 Great Eastern Street, London. This non-skid is composed of a number of separate links, any of which is readily detachable and renewable. It is fashioned to fit snugly in the space between the twin tires, and is free enough to creep round the wheel. This looseness prevents the chain from injuring the tires; in fact it has been found actually to protect and lengthen the life of them. It also makes the chain self-cleaning.

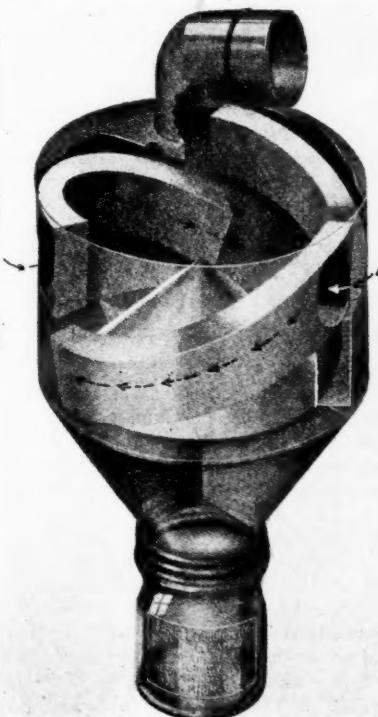
The Brook non-skid is claimed to prevent both lateral and straight skids, such as follow on braking in an emergency; also to give a sure grip when the vehicle is started on a road containing a heavy layer of grease or dust. It is said to be used with success on heavy vehicles, such as brewers' wagons.



Method of attaching non-skid

**Bennett Carbureter Air Cleaner**

IT is now considered essential to fit the carburetors of agricultural motor tractors with air cleaners, so as to prevent grit from getting into the cylinders and working injury to the wearing surfaces. Latterly there has been some demand for the fitting of such a device to the carburetors of motor trucks by way of reducing internal wear, and there has also been some consideration of applying such devices to passenger cars. An air cleaner of the centrifugal type is manufactured by the Wilcox-Bennett Carburetor Co., Minneapolis, Minn., and is illustrated herewith. By the motor suction the air is drawn through three openings in the side of the cleaner into helical tubes. These tubes cause the air to hurl around in the cleaner, and as the tubes have a downward slant, the centrifugal action, together with gravity, separates the dust from the air and causes it to collect in the glass jar which is screwed to the lower end of the sheet-metal housing. The clean air passes up out of the top of the housing to the carburetor. The use of such an air cleaner is claimed to result in less wear on engine bearings, piston rings and valves; increased lubricating oil economy, better fuel economy, less carbon trouble and longer life of the carburetor. The cleaner may be connected to the carburetor by means of a short length of flexible tube. It is made in seven sizes, suitable for carburetors of from $\frac{3}{4}$ in. to $2\frac{1}{2}$ in.



Bennett centrifugal type air cleaner

Dickey of Moto-Meter**Now Captain U. S. A.**

LONG ISLAND CITY, Nov. 3—H. L. Dickey, formerly general sales manager of the Moto-Meter Co., has been ordered to active service in the U. S. Army. Mr. Dickey was recently commissioned with the rank of Captain in the Motor Division of the Ordnance Section U. S. A.

W. S. Cranmer has been appointed assistant manager of sales of the Philadelphia Storage Battery Co., Philadelphia. Mr. Cranmer for the past few years has been in charge of the sales of this company in Pennsylvania, Delaware and New Jersey. He was at one time connected with the sales department of the Waverley company of Indianapolis, and later with the Woods Motor Vehicle Co., Chicago.

C. B. Durham has become general superintendent of the Buick Motor Co., Flint, Mich. He was formerly general master mechanic of the company.

Hal McNaughton has become assistant advertising manager of the Champion Spark Plug Co., Toledo. He was formerly sporting editor of the *Toledo Times*.

F. S. Hyman has joined the Diamond T Motor Car Co. and will assist dealers in Michigan, Ohio and Kentucky. Headquarters will be Cleveland. Mr. Hyman was formerly with the Packard Motor Car Co. E. E. Strickland, formerly manager of the Kansas City branch of the U. S. Tire Co., will cover Kansas, Oklahoma, New Mexico and Texas. Headquarters in Kansas City.

Louis E. Wagner, formerly with Baker Motor Vehicle Co., will be general representative for the territory including North Carolina, South Carolina, Florida, Georgia, Mississippi, Alabama, Louisiana and Tennessee. Headquarters in Atlanta. R. A. Breeden, formerly general representative for the Diamond T, will devote his exclusive attention to Northern Illinois, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Colorado and Nebraska. He will make his headquarters in Minneapolis.

Thomas Scott has rejoined the inspec-

Firestone Moves to Eliminate Tire Abuse

NEW YORK, Nov. 2—In an effort to effect tire conservation and at the same time acquire consumer good-will through educational work the Firestone Tire & Rubber Co., Akron, is sending a fleet of cars about the country. They arrived in this city to-day after a tour of the East, drove to the Mayor's office at the city hall and will leave for a tour of the country.

The fleet is made up of seven or eight White cars, which are equipped with pneumatic tires in order that the tires may be shown under unusually hard service. The cars distribute literature and educational matter, telling owners

Men of the Industry

Changes in Personnel and Position

tion department of the United States Motor Truck Co., Cincinnati.

W. J. Drumpelman is assistant sales manager of the Hudson Motor Car Co., Detroit. He was formerly sales manager of the Chalmers Motor Co. and left to join the Elgin Motor Car Corp. of Chicago as assistant general manager.

Philip W. Sumner is in charge of the sales production department of the United States Motor Truck Co., Cincinnati. He was formerly with the Stewart Iron Works.

A. J. Banta is assistant sales director of the Maxwell Motor Co. and of the Chalmers Motor Co. He was most recently general manager of the Premier Motor Car Co., Indianapolis.

Charles M. Steele, advertising manager of the Saxon Motor Car Corp., expects to leave for France next week in the interest of Y. M. C. A. work in the French army.

William A. Reynolds is district manager for the Goodyear Tire & Rubber Co., New York City, succeeding A. A. Lyon, who is now special representative. Reynolds was formerly in the industrial development department.

Clinton L. Grandy has taken charge of the new branch in Minneapolis, established by the Oneida Motor Truck Co., Green Bay, Wis. This branch will be operated under the name of the Oneida Truck Sales Co.

Harry Wickland, formerly chief engineer of the Hess-Bright Co., has become associated with the U. S. Ball Bearing Mfg. Co., Chicago, as sales engineer in the Eastern States.

how to get the greatest value out of the tires.

In addition to this work Firestone is to use a moving picture service, supplying a film showing how and why tires wear out and break down and how the car owner may prevent damage and short life.

Prominent Speakers for Chicago Service Managers

CHICAGO, Nov. 6—Automobile Service men of Chicago are to be given a series of lectures by the Service Managers Assn. of the Chicago Automobile Trade Assn. The first of these was given last night in

Perrin with Government Aircraft Plant in Dayton

DAYTON, Nov. 3—J. G. Perrin will be connected with the engineering and experimental department of the Government aircraft factory that is to be established here. Perrin is at present connected with the equipment division, plane design section, of the war department and was formerly with the Lozier Motor Co. and the Timken Detroit Axle Co. in Detroit.

Harry Bill is to be factory manager of the airplane experimental station at Dayton, Ohio, of which Major J. G. Vincent is in charge. A factory 60 by 600 ft. two stories high has been completed. Bill was formerly factory manager of the Chalmers Motor Co.

Walter C. Voss has been transferred to Washington, to look after the business of the Standard Parts Co. He was formerly in charge of the Detroit office of the rim and tube division. Mr. Voss is being replaced by A. A. Loeffler, formerly of the Jackson-Church-Wilcox Co., Saginaw, Mich.

F. E. Carpenter has been appointed assistant sales manager of the United States Motor Truck Co., Cincinnati. He was formerly sales manager of the Stewart Iron Works.

P. D. Sampsell is assistant sales manager of the United States Motor Truck Co., Cincinnati, in charge of the Ohio, Indiana, and West Virginia territory.

W. C. Hull is district manager in the southwestern field for the Commerce Motor Car Co., Detroit. He was formerly with the Ross Motor Car Co.

John H. Hartzell is district sales manager for the Federal Motor Truck Co., Detroit, having the territory south of the Ohio River.

ELECTIONS

DETROIT, Nov. 5—Henry E. Bodman is elected a member of the board of directors of the Packard Motor Car Co., filling the vacancy left by Henry B. Joy who has resigned because of Government service.

connection with a dinner at the Lexington Hotel by Elwood Haynes, a pioneer of the motor industry. One hundred of the service men of Motor Row were present. Mr. Haynes' subject was "Origin of Gas and Gasoline Engines." The series comprises sixteen lectures to be given this winter, some of which are: "Types of Gasoline Motors," by Prof. Daniel Roesch, of the Armour Institute of Technology; "Construction and Operation of Gasoline Motors," by an engineer of Buda Co.; "Hydrocarbon Fuels and Carburetion," by an engineer of Fiedeisen and Kropf Mfg. Co.; "Ignition and Timing and Hydrocarbon Engines," by an engineer of the Remy Electric Co.

Wagner Axle Purchases DeTamble Co.'s Plant

INDIANAPOLIS, IND., Nov. 4—The Wagner Axle Co., Chicago, last week purchased the plant of the DeTamble Motors Co., Anderson, Ind. A. G. Wagner, president of the company, said that the company would manufacture a worm-drive axle, and that work would be started as soon as possible on a large contract for the Government. A force of men now is employed in preparing the factory building for occupancy.

294 Franklins Weekly

SYRACUSE, N. Y., Nov. 5—The Franklin Automobile Co. has increased its production from 285 to 294 cars per week, an average of 53.4 cars per day for the 5½ working days of the week. The company has been on a 12,000 car-per-year basis, but the new increase raises this to a 15,000 schedule.

Cadillac Has Built 130,000 Cars

DETROIT, Nov. 3—The fifteenth anniversary of the Cadillac Motor Car Co. was recently celebrated, marking the growth of the plant from a small single-story building to one covering 1,000,000 sq. ft. of floor space. It is estimated that the company has built more than 130,000 cars, the total value of which is \$245,000,000.

Perfection Tire Adds

FT. MADISON, IOWA, Nov. 5—The Perfection Tire & Rubber Co. has started construction work on the second unit of its factory here. The new unit will be 60 by 250 ft., three stories, and will be of steel and concrete construction. All material is now on the ground, and it is hoped to have the building under cover by Dec. 15. The new building will triple the facilities of the Perfection Tire & Rubber Co.

Traverse City Car Co. Making Deliveries

TRAVERSE CITY, MICH., Nov. 3—The Traverse City Motor Car Co. has to date completed six cars which have been sold and will be delivered this week. At present eighteen other cars are under construction, and according to reports a contract is pending calling for ten cars per day. However, the company is not in a position to guarantee delivery on this amount.

At the first regular meeting of the stockholders, the board of directors was increased from five to seven members. It now includes W. J. Chase, C. E. Culver, J. W. Patchin, Charles May, Frank Trude, O. A. George and George H. Curtis. W. J. Chase was chosen president, C. E. Culver, vice-president and Frank Trude, secretary-treasurer.

Titan Specializes on Trucks

MILWAUKEE, Wis., Nov. 3—The Titan Truck & Tractor Co., which was organized recently with a capital stock of \$100,000 to manufacture motor trucks, and is now actively engaged in this work

Current News of Factories

*Notes of New Plants—Old Ones
Enlarged*

in its new plant at 843-849 Thirtieth Street, Milwaukee, has changed its corporate style to Titan Truck Co. The original intention was to manufacture a line of tractors in addition to trucks, but for the present, at least, the entire capacity will be required to produce trucks exclusively. Joseph C. Millman is general manager of the company.

Gillette Rubber Operating New Plant

EAU CLAIRE, Wis., Nov. 3—The Gillette Rubber Co., which is now operating its new plant and turning out from 300 to 350 tires and tubes a day, has started work on a large light, heat and power plant, 65 by 90 ft., to be ready Feb. 1.

Milwaukee Forge Building Addition

MILWAUKEE, Wis., Nov. 3—The Milwaukee Forge & Machine Co., 222-226 Lake Street, Milwaukee, has started work on a complete new manufacturing group to be located at Oklahoma Avenue and the North-Western tracks in the town of Lake, Milwaukee County. The work will represent an investment of \$100,000. The new machine shop will be 65 by 100 ft. and the forge shop 75 by 140 ft., 50 ft. high. The company hopes to be able to take occupancy about Jan. 1.

International Harvester To Build

MILWAUKEE, Wis., Nov. 3—The International Harvester Co. will award contracts at once for the construction of new buildings costing more than \$100,000 at the Milwaukee works. The plans call for a new forge shop, 75 by 147 ft., with a wing, 27 by 325 ft., and a craneway, 70 by 180 ft.

Bond Foundry Acquires Queen City Co.

MANHEIM, PA., Nov. 5—The Bond Foundry & Machine Co. has purchased as a going concern, the property, plant and good will of the Queen City Foundry Co., Toronto, Ont. The new company will continue to manufacture gray iron castings for the trade and in addition will make a line of power transmitting specialties, consisting of shaft hangers, couplings, collars, etc.

Now Page Steel & Wire Co.

PITTSBURGH, PA., Oct. 31—The Page Woven Wire Fence Co. has changed its corporate name to the Page Steel & Wire Co. and is opening an office at 644 Union Arcade, with E. C. Sattley as general manager. The company has developed special analysis high carbon steel products for manufacturing purposes. The general sales houses are at Monessen, Pa., and Adrian, Mich.

Weidely Co. Busy on Tractor Motor Contracts

INDIANAPOLIS, Nov. 5—The Weidely Motors Company, of Indianapolis, Ind., is completing a two-story brick addition to its factory buildings which will add 30,000 sq. ft. of floor space. This addition has been made necessary by the large contracts booked for tractor motors, and it is hoped will temporarily, at least, enable it to handle this business without employing a complete night force of workmen, although several departments will be kept running overtime for months to come.

Within another 30 days the plant addition and much new equipment will be in operation which will bring production on this motor, alone, to 50 per day without interference with the regular production required on twelve and six-cylinder motors.

Annual U-S-L Service Conference

NIAGARA FALLS, N. Y., Nov. 3—The annual conference of the service station representatives of the U. S. Light & Heat Corp. was held at the Niagara Falls factory, Oct. 23 to 25. The meetings were presided over by J. A. White, sales manager of the battery division, and H. A. Harvey, general service manager.

Papers covering every angle of the battery service station business were read and discussed. On the night of the 24th the company gave its annual service dinner at Niagara Inn. Speeches were made by President Smith, Vice-president Lane, Treasurer O'Reilly, Chief Engineer W. L. Bliss, Chief Chemist C. C. Carpenter and by U-S-L service station representatives.

Curtiss Plant Will Cost \$4,000,000

BUFFALO, N. Y., Nov. 6—The Curtiss Aeroplane and Motors Corp. will build its new plant here without the financial assistance of the Government. The plant complete will cost about \$4,000,000. This sum was raised by the issue on Oct. 1 of \$4,000,000 of first mortgage 6 per cent short-term bonds, secured by the new plant itself, but constituting no lien on the old plant or other Curtiss property. The plant will be ready for full operation Nov. 15.

National Machine Plant for Sandusky

HAMILTON, ONT., Nov. 3—The National Machine & Supply Co. is planning to locate its plant in Sandusky, Mich. The old Big Four railroad shops are available and if taken the company expects to employ 200 men within a month.

Triangle Truck Plant Work Resumed

ST. JOHNS, MICH., Oct. 30—Work has been resumed on the plant of the Triangle Truck Co. and will be rushed to completion. Difficulty in obtaining the roofing material has been responsible for the long delay and it is expected that it will be installed in about 2 weeks. Practically all of the material for the first truck is on hand and the parts will be

November 8, 1917

assembled as soon as it is possible to work in the new plant.

Duplex Charlotte Plant Closed

CHARLOTTE, MICH., Nov. 5—The Duplex Truck Co. has closed its plant here and started moving the machinery and equipment into its new plant in Lansing. A large number of the 175 employees will follow the company to Lansing, and it is possible that the Charlotte plant may be used for manufacturing parts. Herbert Loeffler has joined the sales department. He was formerly with the Novo Engine Co. and with the Fairbanks Morse Co.

Hayes Buys Toledo Machinery

DETROIT, Nov. 5—The Hayes Mfg. Co. has purchased for \$25,000 on conditional sale the machinery of the Toledo Machine & Tool Co.

U. S. Switch Now Operating

EAU CLAIRE, Wis., Nov. 3—The United States Switch Co., recently incorporated in Delaware with capital stock of \$1,-

750,000, is now operating its new plant and already is preparing to build a new forge shop, 60 by 130 ft. T. C. Hadley is vice-president and general manager.

Airplane Parts Plant for Bay City

BAY CITY, MICH., Nov. 6—The factory of the Bay City Box & Lumber Co. has been purchased by Michigan and Canadian capitalists and will be used in the manufacture of parts for airplanes for the United States government. Machinery has been ordered and it is expected that it will be installed in a few weeks.

U. S. Tire Salesmen Convene

DETROIT, Nov. 1—The United States Tire Co. is holding a 4-day convention of its salesmen from all parts of the country here this week. About 525 representatives are present and are studying the present trade situation and methods of bettering their selling campaigns. J. N. Gunn, president, and J. C. Weston, director of sales, are the principal speakers. The publicity representative of the

company is issuing a daily convention newspaper styled "Our Horn."

2000 Tillotson Carbureters Daily

TOLEDO, Nov. 6—The Tillotson Mfg. Co. is now in its new three-story building and is manufacturing 2000 carbureters per day. This building covers approximately 3 acres of ground, gives employment to 500 men and is devoted exclusively to carburetor manufacturing.

Work on Triangle Plant Resumed

ST. JOHNS, MICH., Nov. 6—Work has been resumed on the plant of the Triangle Truck Co. and will be rushed to completion. Practically all of the material for the first truck is on hand and the parts will be assembled soon.

Piston Design Booklet

NEW YORK, Nov. 6—Walker M. Levett Co., manufacturer of aluminum alloy pistons, has issued a booklet on the subject of Magnalite Piston Design, so arranged that it can be inserted in the S. A. E. Handbook binder.

Calendar

ASSOCIATIONS

1918

Jan. 3-4—New York Automobile Electric Assn. meeting.

RACING

Nov. 17—Phoenix, Ariz., Two Races for Arizona Cars and Drivers at Arizona State Fair.

SHOWS

Nov. 12-17—Los Angeles, Cal., Motor Car Dealers' Assn., Billy Sunday Tabernacle.

Nov. 12-18—Denver, Col., Automobile Trade Assn., Show Committee, Auditorium. G. A. Wahlgreen, Mgr.

Dec. 3-8—Akron, O., Akron Auto Show Assn., Auditorium Armory. O. G. Armstrong, Mgr.

1918

January—Kalamazoo, Mich., Kalamazoo Automobile Dealers' Assn., Armory.

Jan. 2-9—New York, Salon, Automobile Salon, Inc., Astor Ballroom. John R. Eustis, Mgr.

Jan. 5-12—New York Show, Grand Central Palace, National Automobile Chamber of Commerce.

Jan. 11-19—Philadelphia, 17th Annual Show, Philadelphia Auto Trade Assn., Commercial Museum Bldg.

Jan. 11-19—Providence, R. I., R. I. Licensed Auto. Dealers' Assn., State Armory. Percival S. Clark, Mgr.

Jan. 19-26—New York Motor Boat Show, Grand Central Palace, National Assn. of Engine and Boat Manufacturers.

Jan. 19-27—Cleveland, Seventeenth Annual, Cleveland Automobile Show Co., Wigmore Coliseum. Fred H. Caley, Mgr.

Jan. 19-28—Montreal, Can., Montreal Automobile Trade Assn., Ltd., Almy Bldg. T. C. Kirby, Mgr.

Jan. 21-26—Manchester, N. H., Academy. Couture Bros.

Jan. 21-26—Scranton, Pa., Scranton Motor Trades Assn., Armory. Hugh B. Andrews, Mgr.

Jan. 23-28—Allentown, Pa., Lehigh Auto. Trade Assn., Traylor Motor Co.'s Garage. P. W. Leisinger, Publicity Mgr.

Jan. 26-Feb. 2—Chicago National Show, Coliseum and Armory, National Automobile Chamber of Commerce.

Jan. 26-Feb. 2—Chicago, Salon, Elizabeth Room of Congress Hotel.

Jan. 26-Feb. 2—Harrisburg, Pa., Capital City Motor Dealers' Assn. J. Clyde Myton, Mgr.

February—Peoria, Ill., Peoria Auto and Accessories Dealers' Assn. W. O. Ireland, Mgr.

Feb. 9-16—Bronx, N. Y., 2d Battery Armory, Bronx Automobile Dealers' Assn. D. J. Barrett, Mgr.

Feb. 11-16—St. Louis, Mo., St Louis Auto Mfrs. & Dealers Assn. Robert E. Lee, Mgr.

Feb. 11-16—Kansas City, Mo., Third Annual National Tractor Show.

Feb. 16-23—New York, Second Pan-American Aeronautic Exposition, Grand Central Palace and Madison Square Garden.

Feb. 18-23—Grand Rapids, Mich., Automobile Business Assn., Klingman Building. Ernest T. Conlon, Mgr.

Feb. 18-23—Newark, N. J., N. J. Auto Exhibition, Co. G. First Regiment Armory. Claude E. Holgate, Mgr.

Feb. 18-23—Des Moines, Ia., Des Moines Automobile Dealers' Assn., Coliseum. C. G. Van Vliet & Dean Schooler, Mgrs.

Feb. 18-23—Springfield, Ohio, Springfield Auto Trades Assn., Memorial Hall. C. S. Burke, Mgr.

Feb. 18-23—Waterbury, Conn., United Shows Co.

Feb. 18-24—San Francisco, Cal., San Francisco Dealers' Assn., Exposition Auditorium. G. A. Wahlgreen, Mgr.

Feb. 18-25—Pittsfield, Mass., State Guard, State Armory, James J. Callaghan Mgr.

Feb. 18-27—So. Bethlehem, Pa., Fourth Annual (cars 18-23; trucks 25-27), Coliseum. J. L. Elliott, Mgr.

Feb. 22-March 9—Brooklyn, N. Y., Brooklyn Motor Vehicle Dealers' Assn., Twenty-third Regiment Armory. I. C. Kirkham, Treas.

March—San Francisco, Cal., Motor Truck Dealers of San Francisco, Auditorium. Ivan R. Gates.

Mar. 19-24—Cedar Rapids, Ia., Cedar Rapids Auto Trade Assn., Auditorium.

Apr. 9-13—Stockton, Cal., San Joaquin Auto Trade Assn. Samuel S. Cohn, Mgr.

Sept. 23-28—Chicago, National Accessory Show for Fords, Coliseum.

Engineering

American Railway Master Mechanics' Assn.
American Institute of Electrical Engineers.
Master Builders' Assn.

American Society of Heating and Ventilating Engineers.
Association Iron and Steel Electrical Engineers.
Mining and Metallurgical Society of America.

Society of Automotive Engineers.

NOVEMBER

3-Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio Section at Cleveland.

10-Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. Section at Chicago.

12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.

15—Mining & Met. Soc. Amer. section at Engrs. Club.

15-16—Soc. Naval Arch. & Marine Engrs. annual meeting.

17-Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

19—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

Illuminating Engineering Society.

National Electric Light Assn.
National Gas Engine Assn.
American Society for Testing Materials.
American Institute of Metals.
American Foundrymen's Assn.

Society Naval Architecture and Marine Engineers.

DECEMBER

1-Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

8—Assn. Iron & Steel Elec. Engrs. monthly meeting Ohio section at Cleveland.

15-Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

15-Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

20—Mining & Met. Soc. Amer. Monthly meeting New York section at Engrs. Club.